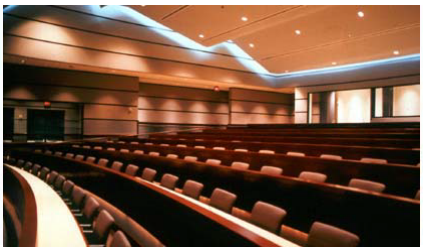




Statement of Qualifications to Provide Services Related to Environmental Concerns

Prepared for:
Santa Monica – Malibu Unified School District
Santa Monica, California

Prepared by:
ENVIRON International Corporation
Irvine and Los Angeles, California

Date:
December 20, 2013

ENVIRON

Contents

p:\!proposals\2013\smmusd\environ soq 20dec2013.docx

Acronyms and Abbreviations

Abbreviation/Acronym	Description
ATI	American Technologies, Inc.
BAAQMD	Bay Area Air Quality Management District
CDE	California Department of Education
DNAPL	dense non-aqueous phase liquids
DTSC	Department of Toxic Substances Control
EHS	Environmental, Health, And Safety
ENVIRON	Environ International Corporation
EPA	United States Environmental Protection Agency
IAQ	Indoor Air Quality
IH	Industrial Hygiene
LBP	Lead-Based Paint
LBP-I/A	Lead Base Paint Inspector-Assessor
LNAPL	light non-aqueous phase liquid
PCBs	polychlorinated biphenyls
PCDD/Fs	polychlorinated dibenzo-p-dioxins and furans
RCRA	Resource Conservation and Recovery Act
RFP	Request For Proposals
RFQ	Request for Qualifications
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
TCE	trichloroethylene
TSCA	Toxic Substances Control Act
US	United States
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

1 Background

Malibu High School and the adjoining Malibu Middle School and Juan Cabrillo Elementary School (referred to hereinafter as the campus or the Malibu campus), were largely constructed in the 1950s and 1960s. Environmental investigations performed in conjunction with proposed construction activities at the campus in 2011 revealed the presence of low concentrations of polychlorinated biphenyls (PCBs) and pesticides in soil near classroom buildings. The affected soil was removed from the campus. Following health concerns expressed by parents and teachers at the high school, a preliminary environmental evaluation was performed in November 2013 in selected classrooms. The evaluation included air, wipe, and bulk sampling for analyses of PCBs. Air sampling results were well within the United States Environmental Protection Agency's (EPA's) acceptable exposure risk range. Wipe sampling results indicated that four samples out of 30 exceeded EPA's cleanup level for indoor residential surfaces of 10 micrograms per 100 square centimeters (10 µg/100 cm^2). Bulk sampling results indicated that three out of 20 samples exceeded EPA's "PCB remediation waste" level of 50 parts per million (ppm) as defined in the Toxic Substances Control Act (TSCA).

While unknown at this time, Santa Monica – Malibu Unified School District (the "District") assumes, for purposes of this Request for Qualifications (RFQ), that PCB-containing caulk may exist in additional buildings at the Malibu location, and throughout the seventeen campuses comprising the District.

The District requires a competent, qualified consulting firm to provide professional services, oversight and supervision of all directly provided and/or subcontracted investigative field work, design and implement remediation (if warranted), oversight of all laboratories testing and monitoring, and professional analyses and reporting.

2 Qualifications and Project Staffing

2.1 Qualifications

An international consultancy, ENVIRON works with clients to help resolve their most demanding environmental and human health issues. In response to the increasing complexity of these issues, we have continuously extended our capabilities and geographic reach, evolving into a truly global partnership with more than 1,000 consultants working from a network of more than 85 offices across the Americas, Europe, Australia, Africa and the Asia-Pacific region.

Founded in 1982, ENVIRON is recognized as a leader in the areas of environmental strategic analysis, hazardous materials assessment and management, regulatory compliance, environmental and public health risk assessment, and risk management. ENVIRON's wide array of public and private sector clients includes federal regulatory agencies and policy arms, state and local governments throughout the US, as well as some of the nation's largest public and private companies, leading law firms, educational institutions, and industrial trade associations. Through the successful completion of thousands of assignments throughout the world, ENVIRON has earned an international reputation as a technically excellent, objective, and astute consulting firm and as a leader in developing creative solutions to our clients' most challenging problems. ENVIRON's health and safety practitioners have expertise in industrial hygiene, EHS compliance assistance and auditing, health risk assessment, indoor air quality evaluation and complaint investigation, and building related hazardous materials (such as asbestos, lead-based paint, and PCBs) survey and abatement oversight.

Over the past 31 years, ENVIRON has provided technical consulting services, litigation support and expert testimony to clients engaged in projects related to PCBs in the environment, in buildings, in products, and in the workplace. ENVIRON's team of renowned building science specialists—including forensic architects, Certified Industrial Hygienists (CIHs), environmental health specialists and engineers—routinely conduct contamination assessment of PCB-containing materials in buildings, oversee remediation, and conduct environmental and health risk assessments. ENVIRON's Site Solution Practice Group has broad experience in identifying and delineating a broad range of contaminants including PCBs, preparing and implementing remedial plans, and achieving closure status for our clients. ENVIRON maintains an extensive library related to historical PCB usage, applications, and the development of toxicological and regulatory standards. Much of our forensic work focuses on the detailed evaluation of analytical information that often contains complex data on congeners, homologues, and aroclors.

Appendix A provides project summaries that demonstrate ENVIRON's experience related to PCBs in the following areas:

- Site investigation and remediation;
- Building material assessment and indoor air; and
- Environmental assessment and material management.

2.2 Proposed Staffing and Project Organization

ENVIRON has assembled a well-qualified team for the District. A project organizational chart is shown on Figure 1. The key members of the ENVIRON Team and their roles are as follows:

- Carol Serlin, PG: Principal-in-Charge and point of contact for the District.

- Farshad Razmdjoo, Managing Principal: Peer review.
- Eric Wood, PG: TSCA Advisor.
- Jeff Raumin, PE: Leading the site investigation and remediation team, supported by Erik Pearson and Adam Duskocy.
- Elizabeth Miesner: Leading the risk assessment team supported by Lisa Yost and Lynne Haroun.
- Doug Daugherty, PhD, PE, CIH: Leading the building technology team, supported by Yi Tian, Fan Xu, and Rod Bronstein.

These key team members all have extensive, directly applicable experience in the range of the tasks contained within the District's RFP. Their qualifications and relevant experience are summarized below. Other qualified ENVIRON personnel will assist as required based on the specific tasks.

Carol Serlin, PG. Carol is a Principal at ENVIRON's Irvine, California office with over 30 years of experience in the assessment and remediation of industrial, manufacturing, aerospace, petroleum, electronics, residential/educational and waste disposal sites in the western US. She has directed remedial investigations to assess hydrogeologic and geochemical conditions, conducted feasibility studies to evaluate appropriate remedial solutions and successfully implemented remedial measures to address a variety of chemicals in indoor air, soil, soil gas, surface water and groundwater. In addition, Carol has provided technical expertise in the areas of environmental risk management, environmental auditing and compliance, due diligence reviews and litigation support; consulted in insurance recovery cases involving soil and groundwater contamination; and provided allocation assistance to responsible parties in multi-party merged-plume situations. Carol has extensive experience working with USEPA (Region 9), Department of Toxic Substances Control (DTSC), Regional Water Quality Control Board (RWQCB), and South Coast Air Quality Management District (SCAQMD), as well as the general public and school districts.

Farshad Razmdjoo. Farshad is the Managing Principal of ENVIRON's Southwest operations, which include Los Angeles, Irvine, San Diego, and Phoenix. He has over 30 years of experience in environmental consulting and engineering. Farshad currently manages a vast variety of consulting projects, including real estate and merger and acquisition due diligence, tenant environmental audits, environmental, health and safety audits, property decommissioning and redevelopment, remedial investigations, remedial action design and implementation, regulatory agency interaction, asbestos management programs, radon surveys, mold investigation and remediation programs and evaluations of lead in drinking water. In addition, he has developed and managed an environmental risk-management program for several real estate and investment clients. Much of Farshad's past and current projects involve assessing environmental issues at commercial and industrial facilities throughout the North America, Europe, China and India.

Eric Wood, PG. Eric has 30 years of experience in environmental science and hydrogeology, with particular emphasis in the areas of litigation support and expert testimony, site investigation and remediation, environmental forensics, insurance support, due diligence, redevelopment of industrial properties, and environmental compliance. Eric has extensive experience in PCB-contaminated building materials assessment as well as PCB-impacted soil investigation and remediation. For instance, he advised a public agency where PCBs were identified in

building materials and in soil at a dam and spillway; advised a public school system for PCB contamination in interior and exterior building materials, in soil, and in indoor air at an elementary school; advised a major university due to PCBs in building materials identified in a dormitory, and advised a developer at multiple office buildings for PCBs in interior and exterior building materials and in soil. He recently directed a project of site investigation and remediation of PCB-impacted soil, concrete, and paint chips at an uncontrolled dumping site in EPA Region I. The investigation was completed to support a Modified Self-Implementing Plan pursuant to 40 CFR 761.61 and to comply with the Massachusetts Contingency Plan (310 CMR 40.0000) as the site is being regulated under both federal and state jurisdiction. Due to the lateral extent of impacted media, over 25 test pits and 300 soil borings were completed in accordance with Subpart N of TSCA, with biased sampling based on the soil stratigraphy, historical information, and the presence of a fill layer. ENVIRON developed and directed the engineering design for the selected remedial alternative. The selected remedy involved excavation and off-Site disposal of approximately 10,000 cubic yards of impacted media, dewatering and shoring, erosion controls, soil stabilization, perimeter dust monitoring, construction of a decontamination pad, post-remedial confirmatory sampling per Subpart O of TSCA, and site restoration.

Jeff Raumin, PE. Jeff is a Senior Manager at ENVIRON's Irvine, California office and has more than 20 years of experience in environmental science and engineering, with special emphasis in site investigation and remediation. He has been involved in multiple complex site investigation and remediation programs at sites impacted by petroleum hydrocarbons, chlorinated solvents, metals and other chemicals, where he successfully negotiated site closure. Remediation technologies utilized include soil vapor extraction, UV oxidation, in situ chemical oxidation, bioremediation, and excavation. Jeff routinely interacts with various regulatory agencies such as DTSC, RWQCB, and EPA Region 9.

Erik Pearson, CPP, EIT. Erik is a Senior Manager at ENVIRON's Irvine, California office and has over 16 years of experience in environmental compliance, site investigation and site remediation. He provides technical and management expertise for soil and groundwater remediation projects, regulatory compliance projects, air quality permitting compliance and human health risk assessments. Erik has designed, implemented and managed various phases of site characterizations, feasibility studies, cost estimations, remediation engineering design and implementation and health risk assessments at numerous contaminated sites under various federal, state and local environmental regulatory agencies. He has performed remediation engineering for sites contaminated with petroleum hydrocarbons, chlorinated hydrocarbons, 1,4-dioxane, light non-aqueous phase liquid (LNAPL), dense non-aqueous phase liquids (DNAPL), perchlorate and nitrate, and has tailored a wide variety of ex situ and in situ techniques applicable to each specific project. Erik also has extensive experience dealing with regulatory agencies such as DTSC, EPA Region 9, and SCAQMD.

Adam Duskocy, PG, LEP. Adam has over 10 years of experience as a geologist working on hazardous materials-impacted, petroleum-impacted, and brownfield sites throughout New England. Adam has broad range of experience in PCB-containing building materials assessment, management, and remediation. For example, he recently oversaw the remediation and demolition of approximately 750,000 square feet of PCB-impacted (up to 5,000 mg/kg) industrial building space for a shoreline development in Connecticut. ENVIRON used scarification, sand and sponge blasting techniques, and segregation/removal to achieve compliance. EPA Method 8082 was used to analyze PCBs using Soxhlet extraction, which is necessary and highly recommended by EPA. ENVIRON also developed many sampling schemes on floors, walls, fencing, etc. to achieve compliant characterization, which enabled segregation (a key cost savings mechanism).

Elizabeth Miesner. Liz is a Principal at ENVIRON's San Francisco, California office and has over 24 years of experience conducting and managing environmental health assessments. She has managed and conducted exposure/risk assessments for numerous Comprehensive Environmental Response, Compensation and Liability Act (CERCLA-Superfund), Resource Conservation and Recovery Act (RCRA) and other hazardous waste sites involving the evaluation of human health risks from exposure to contaminants detected in soil, sediment, soil gas, air, groundwater and surface water. She has prepared and implemented numerous ambient/indoor air monitoring plans to evaluate potential vapor intrusion into a building or sources within a building including monitoring for chlorinated volatile organic compounds, formaldehyde, methane, PCBs and air quality parameters in over 100 buildings (commercial/industrial buildings, homes, schools, and daycares). Ms. Miesner is familiar with agency requirements and guidelines and has provided technical risk assessment support for clients at client/agency meetings and negotiations. In California, she has worked on projects prepared for and negotiated with the USEPA Region 9, DTSC, the San Francisco and Los Angeles RWQCBs, and the Bay Area Air Quality Management District (BAAQMD).

Lynne Haroun. Lynne is a Principal Consultant at ENVIRON's Emeryville, California office and has over 25 years of experience in environmental consulting, with emphasis on human health exposure and risk assessment, risk communication, strategic planning and regulatory support in applications ranging from consumer products to contaminated waste sites. In California, she has particular expertise in Proposition 65, and has conducted evaluations of exposures to chemicals through the use of products encountered by consumers in daily living, as well as by workers in commercial and industrial settings. Lynne has managed or performed human health risk assessments at over 200 hazardous waste sites, commercial properties, and schools in California and other areas of the US to support decisions regarding the need for remediation and development of cleanup goals. For instance, for a school district in Southern California, she prepared a preliminary endangerment assessment at a property slated for construction of a new high school. The construction project was on a very tight schedule and the school would lose matching state funds if the project were delayed. The property was formerly used for agricultural purposes and pesticides had been detected at the site. ENVIRON worked closely with the project team to ensure that sampling and analytical methods would meet risk-based detection limits. Although elevated concentrations of contaminants were detected at the property, a decision was made to leave contamination in place based on consideration of the site grading and construction plans, where contaminated soils would be below building footprints or pavement. The results of the risk assessment were used to support these risk management decisions.

Lisa Yost, DABT. Lisa is a board-certified toxicologist with 30 years of experience assisting clients assessing human health risks related to exposure to a variety of chemical substances in environmental media (soil, water and the food chain) in the workplace or within consumer products. Lisa has extensive experience crafting culturally relevant public health messages directed to diverse technical and non-technical audiences. She has provided technical support for litigation and detailed toxicological evaluations of numerous chemicals and chemical classes, including polychlorinated dibenzo-p-dioxins and furans (PCDD/Fs), PCBs, polycyclic aromatic hydrocarbons (PAHs), pesticides, trichloroethylene (TCE) and other solvents, mercury and arsenic. Lisa serves as a member of the Minnesota Department of Health Environmental Health Tracking and Biomonitoring Advisory Panel, also serves as a two-year counselor with the Northland Society of Toxicology, and is an adjunct instructor with the Division of Environmental Health Sciences at the University of Minnesota School of Public Health. Lisa's particularly relevant expertise with PCBs includes working with a project team to evaluate potential exposure to PCBs in fluorescent lighting within an urban school setting. She analyzed EPA risk

assessment tool and worked with team to derive a representative short-term action level for indoor air in schools. She also managed and completed a comprehensive investigation and human health risk assessment evaluating potential worker exposure to PCBs discovered in concrete joint compound in a flight-line area for commercial aircraft in Washington. She researched current regulatory guidance within EPA for non-liquid PCBs and evaluated applicable assessments conducted nationwide. Site characterization suggested limited migration potential for PCBs from joint compound. The risk assessment results supported phased removal of PCB-containing material that was both health-protective and practical. She also recently worked with a project team including toxicologists, epidemiologists and chemists in several companies evaluating the hazard and toxicity data for PCBs with a focus on non-cancer endpoints and is currently managing a project to estimate potential serum levels of PCBs in individuals exposed in an urban setting.

Douglas D. Daugherty, PhD, PE, CIH. Doug is the Managing Principal of ENVIRON's San Francisco, California office with over 16 years of experience using his cross-disciplinary background in chemical engineering and industrial hygiene to provide solid solutions in areas such as industrial hygiene, air quality, air toxics risk assessments, emergency release, indoor environmental quality and litigation support. He conducts indoor air sampling for biological and chemical agents using his background in biochemical engineering and industrial hygiene. He has performed and managed sampling for potential mold and chemical contamination in commercial buildings and in residential dwellings for both commercial and insurance clients as well as for litigation teams. Doug has also prepared remediation protocols for commercial and residential buildings and has supervised successful remediation activities in these structures. Recently, Doug provided consulting and expert testimony services for the City of Los Angeles, acting by and through the Los Angeles Department of Water and Power, in the consolidated cases under and including Washington Mutual Bank v. City of Los Angeles Department of Water and Power. The case involved alleged underground PCB transport through conduits during a transformer fire in an underground vault in Los Angeles.

Yi Tian, CIH, CSP, QEP. Yi is a Senior Manager at ENVIRON's Irvine, California office with over 20 years of comprehensive working knowledge in industrial hygiene, air quality, and compliance issues. She is proficient in exposure assessment, health risk assessment, air dispersion and receptor modeling, air quality monitoring, and air quality permitting and compliance assistance. She has over 15 years of experience managing projects in industrial hygiene, health and safety, program development, and indoor environmental quality. She also has extensive experience in managing hazardous materials assessment and decontamination in buildings, mold investigation and remediation, lead-based paint (LBP) survey and removal, and PCBs contamination evaluation and abatement.

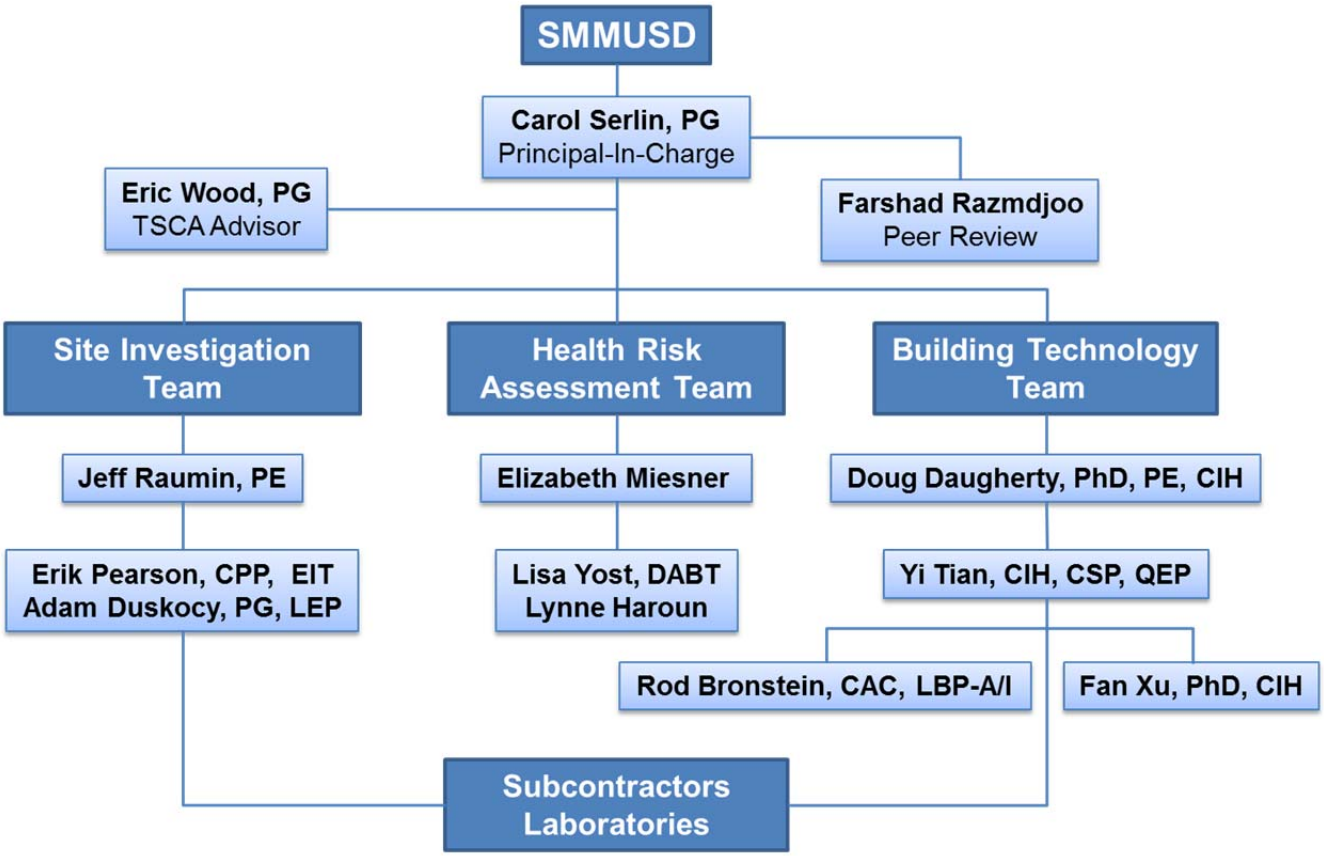
Fan Xu, PhD, CIH. Fan is a Senior Associate at ENVIRON's Los Angeles office. She has over seven years of experience in industrial hygiene and environmental assessments. Her experience includes assessments of occupational exposures to chemical substances in manufacturing facilities and laboratories, ergonomics assessment for office and heavy industry workers, ventilation surveys, noise surveys in airports, and oversight of a 13-acre asbestos remediation project. Other experience includes recommending control measures to industry and conducting mold assessment and remediation oversight. Fan's training covered a variety of topics including various hazardous agents monitoring, ventilation, noise and noise control, non-ionizing radiation, ergonomics, indoor air quality, and hazardous waste operations and emergency response, air quality, and real-time monitoring equipment.

Rod Bronstein, CAC, LBP-A/I. Rod is a Senior Associate at ENVIRON's Irvine, California office. Rod has over 20 years of experience in building materials surveys and assessment, abatement oversight, and indoor environmental quality. He is well versed in air monitoring techniques and equipment and has conducted air monitoring and sampling in various industrial, commercial, and residential settings. He has conducted asbestos, lead-based paint, and PCB surveys in office buildings, schools, hotels, and other facilities.

Resumes of the above key ENVIRON personnel are included in Appendix B. The completed Health, Security, Safety and Environmental Pre-qualification Form is included as Appendix C.

ENVIRON proposes American Technologies, Inc. (ATI) as the building material abatement subcontractor. A summary of ATI's qualifications and copies of relevant credentials are included in Appendix D.

Figure 1. Proposed Project Organization



3 Scope of Work and Execution Schedule

ENVIRON understands that the scope of work includes the following six major tasks, while the District may request other smaller tasks:

3.1 Initial Abatement

From the November 2013 assessment, wipe-sampling results indicated that 4 samples out of 30 exceeded EPA's cleanup level for indoor residential surfaces of 10 micrograms per 100 square centimeters (10 µg/100 cm^2). Bulk sampling results indicated that three out of 20 samples exceeded EPA's "PCB remediation waste" level of 50 parts per million (ppm) as defined in the Toxic Substances Control Act (TSCA). ENVIRON understands that, in response to the complaints/concerns raised at a school board meeting, District officials decided to relocate students from the affected classrooms to different rooms on the High School Campus and to nearby Juan Cabrillo Elementary School. If agreeable to the District that this should be a priority, ENVIRON and ATI will clean up these identified/affected classrooms first.

3.2 Indoor Air Quality

The District anticipates further indoor air quality testing for PCBs at the three schools to evaluate potential acute health hazards via the inhalation pathway. Specifically, ENVIRON will perform the following tasks:

- Design the sampling program
- Implement the program
- Review the results, evaluate health risks, and make recommendations regarding the need for any additional sampling or mitigation.
- Prepare a written report documenting the sampling and analytical methods, results, conclusions and recommendations.
- Present the study results via an oral presentation, if required by the District
- Interact with EPA Region 9, DTSC, California Department of Education (CDE) and LA County Health as required.

The District further anticipates expansion of this process to its remaining District campuses. However, for purposes of developing an execution schedule, ENVIRON has not included other campuses.

3.3 Best Practices

Based upon the detection of PCBs in wipe and bulk samples of window caulking, and the age of the buildings at the Malibu campus, the District assumes additional PCB-containing caulk may be detected at the campus. While the District anticipates strict compliance with TSCA regulations regarding the abatement of caulking above the regulatory threshold, it realizes that this process will require additional time to complete. Therefore, consistent with EPA's suggested "best practices" for caulk in older buildings, the District desires to undertake preliminary, and continuing, cleaning activities to minimize potential exposure by students, teachers and staff to aging caulk.

In order to integrate environmental information into the maintenance and construction programs of the District, ENVIRON will develop, and assist in the implementation of, a Best Practices

program at the Malibu campus. The program will include a preliminary inspection of caulk conditions, cleaning of dust and residue potentially associated with caulk, disposal of cleaning supplies, interaction with government agencies regarding these activities, as necessary, and documentation of the same. The practices should include short -term and long-term elements. The Best Practices program will include an informational element for disclosures to students, staff and teachers on how to reduce the risk of exposure to the caulk and how to protect them in the event of contact with the caulk. The program will be suitable for all campuses within the District.

3.4 Site Investigation and Remediation Program

ENVIRON understands that the 2011 environmental assessment identified additional potential contaminant source areas on the campus. Because those areas were not to be disturbed as part of the proposed construction activities, those areas (as well as areas surrounding the Juan Cabrillo Elementary School) were not investigated. As a result, there is a need for a comprehensive site investigation, risk assessment, and remediation program for the campus. The objective is to ultimately reduce the potential human health hazards to acceptable levels in the indoor and outdoor settings on the campus. To achieve this goal, ENVIRON will perform the following tasks:

- Under the oversight of the DTSC's School Property Evaluation and Cleanup Division and EPA Region 9 TSCA Coordinator, ENVIRON will conduct site investigations to identify additional sources of environmental contaminants, including but not limited to PCBs in caulk, as well as anticipated contaminants in soil such as pesticides, VOCs, and heavy metals.
- ENVIRON will conduct human health risk assessment using the investigative results in order to develop risk-based clean-up goals. We may develop a risk management plan for issues that can be managed in place.
- ENVIRON will oversee the abatement for TSCA-regulated PCBs on the Malibu campus.
- ENVIRON will develop a procedure to enable timely identification, abatement, and disposal of PCB-containing waste.
- ENVIRON will assist with regulatory negotiations, as needed, for all of the above-referenced activities.

3.5 Community Outreach Activities

If required by the District, ENVIRON will participate in community outreach activities such as attending/presenting at a town-hall meeting, developing fact sheets, and attending/presenting to the parent/teacher advocacy group - Malibu Parents for Healthy Schools. It should be noted that DTSC may require the preparation of a Public Participation Plan. Based on our experience, DTSC typically participates in public outreach and communications as well.

3.6 Meetings and Progress Reports

ENVIRON understands that the District wishes to enter into an Agreement on January 16, 2014. Once the Agreement is executed, ENVIRON will attend a kick-off meeting and will conduct an initial site visit. If agreeable by the District, ENVIRON proposes to meet with the concerned parents and teachers to solicit input and to demonstrate the District's transparency. As mentioned above, it is likely that DTSC will want to take an active role in public communications, meetings, and outreach activities. Throughout this assignment, ENVIRON will provide progress reports to the District at a frequency specified by the District.

An estimated schedule to complete above scope of work for the first six months is included in Appendix F.

4 Acknowledgement of Insurance Requirements

ENVIRON acknowledges that the firm has the following types of insurance coverage:

(a) Commercial General Liability $1 Million occurrence/$5 Million aggregate,

(b) Business Automobile Liability $1 Million,

(c) Contractor's Professional Liability (errors and omissions) $1 Million occurrence/$5 Million aggregate,

(d) Contractor's Pollution Liability $1 Million occurrence/$5 Million aggregate, and

(e) Workers Compensation as statutorily required.

The District will be identified as an additionally named insured on the above policies, as appropriate, if ENVIRON is awarded the contract.

5 Contractual Terms and Conditions

Please see Appendix E for ENVIRON's proposed contractual terms and conditions.

6 Billing Rates and Costs

ENVIRON International Corporation

SCHEDULE OF FEES
FIXED HOURLY RATES FOR TIME AND MATERIALS CONTRACTS
Effective January 2013

ENVIRON will bill monthly for the actual time and expenses incurred on the client's behalf in performance of the contracted effort. ENVIRON reserves the right to increase these rates [redacted] annually. Labor will be billed at the fixed hourly rates indicated below. Materials and supplies, travel, and any other direct cost plus a handling charge of [redacted]. A [redacted] communications and computer charge will be added to all staff time charges. ENVIRON does not directly charge for in house copies or normal phone company charges.

Category:	Rate $/hr.
Principal	[redacted]
Principal Consultant	
Manager 10	
Manager 9	
Manager 8	
Senior Associate 7	
Senior Associate 6B	
Associate 6	
Associate 5	
Associate 4	
Associate 3	
Draftsperson	
Support	

Appendix A

Experience: PCB Project Summaries

Project Experience: Polychlorinated Biphenyls

Over the past 31 years, ENVIRON has provided technical consulting services, litigation support and expert testimony to clients engaged in projects related to polychlorinated biphenyls (PCBs) in the environment, in buildings, in products, and in the workplace.

Site Investigation and Remediation

PCB Remediation | Gas Compressor Stations Nationwide

ENVIRON was retained by a confidential utility client to develop risk-based remedial investigation and remediation approaches for PCBs and other hazardous substances at over 50 gas compressor stations in ten states. The project included the investigation of contaminated soils, sediments, groundwater, drain lines, equipment and building surfaces. ENVIRON provided overall project management support to the client team, oversaw site characterization, developed and implemented a comprehensive database for characterization and remedial design data, developed remediation goals, assessed innovative PCB treatment technologies, evaluated and selected remedial technologies, developed remediation plans, and assisted in agency negotiations. ENVIRON also conducted an evaluation of PCB migration rates in the various contaminated media to support rate recovery negotiations with the Federal Energy Regulatory Commission.

Source Characterization and PCB Fingerprinting | New Jersey ISRA Site

ENVIRON conducted an extensive site characterization and developed a cleanup program to remediate an industrial ISRA (formerly ECRA) site in northern New Jersey contaminated by PCB-laden oils. The site characterization program and cleanup levels were developed in negotiations with the New Jersey Department of Environmental Protection (NJDEP). Chemical test protocols were used to develop a fingerprint of the oil for comparison with samples from potential source areas, and an industrial safety survey of the plant was conducted to measure potential occupational exposures to PCBs in air and on surfaces. ENVIRON evaluated potential on-site technologies for stabilizing and treating PCB-contaminated areas beneath existing buildings. Oil recovery and soil remediation were also implemented as part of the site-wide remediation program.

Superfund Site | Pennsylvania

Conducted an $18M project that involved the excavation and off-site disposal of 12,000 cubic yards of PCB-impacted soils, the near-shore excavation of 2,000 cubic yards of PCB-impacted sediments and on- site placement of this material, placement of a sub-aqueous cap (marine mattress design) over PCB-impacted sediments, installation of a permanent sheet pile wall along the adjacent river banks, and the placement of a soil cover and vegetation of the entire site. Other activities included negotiations with EPA and PA DEP on behalf of the PRP Group during the implementation of the construction and post construction phases.

Industrial Aerospace Client | CT

ENVIRON staff completed $1M pre-design investigation activities as part of a RCRA cleanup. Pre-design investigations were conducted at five separate areas involving 15,000 cubic yards of PCB-contaminated soil including Geo-Probe sample collection, immunoassay PCBs field screening, data validation, data evaluation and report preparation. Drawings of site utilities and engineering estimates of contamination quantities were also prepared. Construction is anticipated to involve excavation of soils to an EPA-approved landfill, and site restoration. ENVIRON also prepared the first Land Use Application in EPA Region I to change the existing land use classification from residential to industrial, in support to a risk assessment.

Brownfield Site: Former Industrial Parcel | Stamford, CT

Responsible for environmental assessment, permitting, remedial planning and implementation of over 80 acres of Brownfield property in Stamford, Connecticut. The project included the preparation of numerous environmental condition assessment forms (ECAFs) and associated Form III filings to facilitate the transfer of the site. Subsequent to the transfer of the sites, supplemental subsurface investigation activities related to identified data gaps, attributed to current and historical site usages, were completed to facilitate the three dimensional delineation of the nature and extent of the previously observed soil impacts. Activities were completed to achieve the provisions of the Connecticut Transfer Act Program and to complete all necessary supplemental ESA activities to facilitate compliance with the Connecticut Remediation Standard regulations (RSRs).

Based upon the results of those supplemental subsurface investigation activities, a Remedial Action Work Plan (RAWP) was developed to present the approach and

strategy for the remediation of soils impacted by the applicable constituents of concern. The presence of PCBs on the Site required the additional development of a PCB Remedial Action Work Plan to present the approach and strategy for the remediation of PCB- impacted soils and building materials in accordance with federal regulation, specifically 40 CFR 761 (a) and (c). Following the completion of extensive characterization and delineation activities, active remedial activities included the scarification and removal of impacted building materials, excavation, segregation, and off-site disposal of impacted soils, non-porous materials decontamination, and the installation of a cap to meet applicable high occupancy requirements. In addition to active remediation, the remedial design included the submission of an Engineered Control Variance Request and the recording of Environmental Land Use Restrictions (ELUR).

Former Textile Mill, Confidential Client | MA

Conducted remediation oversight at a 24 acre site, with two existing textile mills dating to the late 1800s. The site was proposed to be demolished and utilized for a new 145,000 square foot major retail store. Soil, groundwater and sediment sampling was undertaken based on the presence of historical USTs/ASTs/transformers. During the subsurface investigation, free petroleum product and PCBs exceeding 50 mg/kg were encountered in soil. ENVIRON generated a remediation cost estimate for approximately $300,000.

Raymark PCB Superfund Site | Stratford, CT

ENVIRON staff served in a QA/QC role for this USEPA-funded, US Army Corps of Engineers-managed cleanup project. Many dozens of residences had been constructed with PCB-impacted soils given from an asbestos brake pad manufacturing plant to local developers, and thousands of cubic yards of such soil had to be removed from these residences. Extensive work and sampling plans, HASPs, engineering designs, and QA/QC plans had to be developed and implemented in the field.

University | MA

Provided technical direction and Licensed Site Professional (LSP) services for the investigation and remediation of PCB-contaminated soil, sediment, and indoor air due to PCBs in building materials at a major university. ENVIRON coordinated state and federal regulatory requirements pursuant to TSCA and the Massachusetts Contingency Plan. Our team directed site characterization, human health and environmental risk characterizations, and remedial activities for the site. ENVIRON also Implemented a rapid investigation and cleanup so that university operations would not be impacted during the academic year.

Print Shop | Norwood, MA

Provided LSP of Record services for a print shop that had been impacted by a release of PCB-containing oil from either historic site operations or a machine shop located immediately adjacent and upgradient of the site. A plume of free phase oil containing elevated concentrations of PCBs was determined to extend beneath the site building with highest concentrations detected at the property line shared with the abutting machine shop. ENVIRON negotiated site access with abutting property owners who were resistant in granting access to conduct subsurface investigations, which required assistance from the MassDEP and Region I of the USEPA. Site access was eventually granted and response actions are ongoing.

Brownfields Site | Florence, MA

Provided ecological risk characterization services at a former Brownfields site in Florence, MA where a release of PCB- containing oil had occurred beneath the site building creating a plume of free phase oil that necessitated the installation of a recovery system. Information obtained from subsurface investigations conducted along the abutting Mill River was used to determine the presence of potential migration pathways and sensitive environmental receptors.

Industrial Property | Greenfield, MA

PCB-containing transformers and impacted concrete pads were detected during a USEPA Brownfields assessment and remediation project conducted at the former GTD Tap and Die factory in Greenfield, MA in which ENVIRON personnel served as the Project Manager and LSP of Record for state related submittals. ENVIRON Personnel determined the extent of impacted concrete and arranged for the removal of moderately large transformers, which contained dielectric fluid with PCBs above 50 ppm, with a company who agreed to remove the transformers at no cost.

Shipyard | Hingham, MA

Managed the delineation and removal of PCB-contaminated soil from an area proposed for future residential development at the former Hingham Shipyard property. Following the preparation and implementation of a US EPA-approved Self-Implementing Plan and a MassDEP-approved Release Abatement Measure (RAM) Plan, ENVIRON personnel oversaw an extensive soil pre-characterization program and selected appropriate off-site disposal facilities. ENVIRON also supervised a comprehensive confirmatory sampling program, developed a site-specific health and safety plan, and implemented a quantitative US EPA-conditionally accepted in-situ field screening program for the collection of real-time PCB data for soil excavation and removal. An overburden and bedrock groundwater investigation was developed and supervised by ENVIRON.

Regulatory closure reports and a site- specific risk assessment were prepared under the MCP and US EPA TSCA programs.

Power Generating Facility | Weymouth, MA

As part of the renovation of the Edgar power generating facility in Weymouth, MA, ENVIRON staff conducted subsurface investigations which delineated the extent and distribution of PCB-affected soil and groundwater beneath several former transformers. In accordance with US EPA TSCA regulations, activities included on- site, quantitative in-situ PCB field screening of soil, groundwater, and surface wipe samples, supervision of soil excavation, and management of soil transportation to select soil disposal facilities. ENVIRON personnel conducted offsite facility selection and managed the disposal of TSCA PCB-impacted soil and prepared regulatory closure reports to the US EPA and MassDEP.

Former Oxford Paper Mill | Lawrence, MA

ENVIRON conducted management and oversight of all on-site abatement, demolition, and excavation activities; site investigations and inspections for regulated hazardous materials; characterization of all materials for proper disposal; and certification of both Self-Implementing and Risk-Based Cleanup and Disposal Plans. ENVIRON also provided asbestos and PCBs air monitoring to ensure worker safety for the demolition of six buildings at the former paper mill. Responsibilities consisted of on-site inspection and collection of bulk material samples, assessment of asbestos- containing materials, and interpretation of data and preparation of final reports. The project included the transportation and disposal of over 6000 tons of asbestos and PCB-contaminated debris.

Pinette's Salvage Yard Superfund Site | Washburn, ME

Prepared the final design (drawing and specifications), bid package preparation, and public bid procurement of a $6M U.S. EPA remediation contract involving on-site treatment of PCB and VOC contaminated soil via a proprietary solvent extraction process, and final soil capping. ENVIRON also served as the Project Engineer performing or supervising resident engineering for the subsequent construction. In addition to the innovative solvent extraction technology, key project work elements include a packaged wastewater treatment system, excavation and off-site incineration, and administration of the project in accordance with construction, regulatory compliance and sampling and analysis requirements.

Confidential Client | ME

Performed RCRA facility closure, subsurface investigation, and construction management for a Fortune 500 client in Maine. Our team conducted design, oversight, and management of a subsurface exploration program including completion of two (2) subsurface geophysical surveys and advancement of over 350 soil borings, 100 test pits, 100 marine sediment sample locations, installation of 11 overburden and 11 bedrock groundwater monitoring wells, completion of two (2) rounds of down- hole geophysics, and completed data evaluation. ENVIRON also conducted excavation of approximately 22,400 cubic yards of petroleum and PCB-impacted soil; investigated overburden and bedrock groundwater contamination (including petroleum-related compounds, carbon tetrachloride, trichloroethene, and 1,2- dichoroethane); conducted oversight of the demolition of 9 buildings (approx. 34,000 sq. ft.); the disposal of scrap metal, C&D debris, contaminated concrete, petroleum impacted soil, asbestos containing material, universal waste, and chemical waste; and the on-Site Storage of 2,100 cubic yards of potentially clean concrete debris.

Brownfields Property | Springfield, VT

ENVIRON coordinated the assessment of suspected sources of PCB-contamination during a USEPA Brownfields investigation, and performed project management at a former Manufacturing facility in Springfield, VT. Soil samples, collected at various depth intervals over a 15-foot grid pattern were field screened using the Dexsil spectrophotometric test kit with representative samples submitted for laboratory methods as a cost saving approach, which was approved by the VT DEC and USEPA. ENVIRON staff conducted literature research into the issue of PCB-containing caulk as a potential source of impact from PCBs to indoor air due to the uncertainty that exists among professionals throughout the United States and Canada in its distribution, potential for breakdown and dispersion, and toxicity and exposure risk. ENVIRON personnel demonstrated the ubiquitous nature of PCB Caulk (caulk containing > 50 ppm of PCBs) and/or sealants that were manufactured between 1955 and 1975. A review of studies conducted in the United States and Europe demonstrate considerable variation in the occurrence (16-73%), concentration (≥50 to 550,000 ppm), and composition (Aroclors 1248, 1254, 1260, 1262; and German Clophens A40, A50 and A60) of PCB Caulk. The USEPA never authorized the use of PCBs in caulk and current regulations require the strict removal of such material when found. Such extreme measures may not be needed given that the volatile fraction of PCB compounds do not pose the same risk as the heavier weight compounds do, which were used to generate the majority of toxicity data. Due to the extreme costs associated with strict removal requirements, the USEPA is considering the reassessment of

PCB use authorizations, as well as reevaluating the disposal regulations that differentiate bulk PCB Caulk from PCB remediation waste to reduce the complexity presented by existing regulations.

Building Materials Assessment and Indoor Air

PCB Caulk Study Review | White Paper

For a confidential client, ENVIRON is preparing a White Paper summarizing the issues surrounding PCB-containing caulking materials. Although the United State Environmental Protection Agency (USEPA) has been conducting research, gathering data, and publishing information related to PCB in caulking materials on its web site, this issue was first identified in 2004 by a group of environmental health researchers at Harvard School of Public Health (HSPH). The researchers identified caulking and sealing materials as an unrecognized and possibly widespread source of PCB contamination in schools and buildings constructed from 1950 to late 1970s. They concluded that caulking should be routinely analyzed for PCBs and managed appropriately to reduce potentially significant health risks.

For the White Paper, ENVIRON is also reviewing a Pilot Study to Address PCB Caulk in New York City School Buildings, which has been conducted as a result of a Consent Agreement and Final Order between the New York City School Construction Authority and the USEPA.

PCB Air Sampling | California

ENVIRON conducted ambient and indoor air sampling and monitoring in a building to be leased by pediatric medical offices and out-patient clinics. Information on previous subsurface investigations and soil remediation activities indicates that the primary chemicals of potential concern in soil and shallow groundwater are polychlorinated biphenyls (PCBs) and volatile organic compounds (VOCs). ENVIRON collected air samples from various indoor locations as well as outdoors (for comparison purposes). VOC samples were collected using pre-cleaned Summa canisters and analyzed using EPA TO-15 SIM and PCB samples were collected following low volume polyurethane foam (PUF) sampling procedures and were analyzed for PCB homologs using EPA Method 1668. ENVIRON also conducted screening level risk assessment using the analytical results.

Confidential Abrasives Client | CT

ENVIRON conducted comprehensive sampling of the interior and exterior of several buildings for the presence of PCBs, lead, asbestos, and other hazardous materials, as part of pre-demolition surveys. Cost estimates and abatement and demolition plans were prepared for this client. PCB presence in window caulking was a particular focus of this program.

Confidential Major Developer | Greater Boston Area, MA

ENVIRON conducted comprehensive sampling of the interior and exterior of several buildings for the presence of PCBs, lead, asbestos, and other hazardous materials, as part of pre-demolition surveys. Cost estimates and abatement and demolition bid specifications were prepared for this client, and field oversight and clearance sampling for asbestos has been conducted during demolition of a three-story major department store. PCB presence in window caulking was a particular focus of this program.

Public Agency | Central MA

Assisted a public entity with the investigation of PCB-contaminated building materials identified during a major renovation project. Our team directed site characterization activities that subsequently identified PCBs in the environment proximal to the structure. Negotiations were conducted with state and federal regulators on behalf of the client. ENVIRON also coordinated state and federal regulatory requirements pursuant to TSCA and the Massachusetts Contingency Plan.

Elementary School | MA

ENVIRON served as Licensed Site Professional (LSP) for emergency response actions and a Release Abatement Measure due to the presence of PCBs in building materials and the environment identified at an elementary school. ENVIRON directed site characterization activities as well as assisted in community relations and public participation meetings. ENVIRON also coordinated state and federal regulatory requirements pursuant to TSCA and the Massachusetts Contingency Plan. Our team directed human health and environmental risk characterizations and remedial activities for the site. ENVIRON personnel achieved a Response Action Outcome in a timely manner so that school operations were not impacted during the academic year.

Confidential Manufacturing Client | RI

ENVIRON conducted comprehensive sampling of the interior and exterior of several buildings for the presence of PCBs, lead, asbestos, and other hazardous materials, as part of pre-demolition surveys. Cost estimates and abatement and demolition bid specifications were prepared for this client, and a pre-bid meeting with contractors was held, and contractor bids were evaluated on technical and cost components. PCB presence in window caulking was a particular focus of this program.

Public Agency | Central MA

Assisted a public entity with the investigation of PCB-contaminated building materials identified during a major renovation project. Our team directed site characterization

activities that subsequently identified PCBs in the environment proximal to the structure. Negotiations were conducted with state and federal regulators on behalf of the client. ENVIRON also coordinated state and federal regulatory requirements pursuant to TSCA and the Massachusetts Contingency Plan.

Public Agency | Central MA

ENVIRON performed post-remediation sampling of building materials, soil and groundwater for PCBs following a transformer fire at the Winsor Dam Gate House. Testing was conducted to ensure the sealant applied to the concrete floor and walls sequestered any PCBs that may have been released to the concrete surfaces from the fire and subsequent clean-up activities. Soil and ground water testing was conducted to ensure potential migration of PCBs to environmental media did not occur during the clean-up activities.

Elementary School | MA

ENVIRON served as Licensed Site Professional (LSP) for emergency response actions and a Release Abatement Measure due to the presence of PCBs in building materials and the environment identified at an elementary school. ENVIRON directed site characterization activities as well as assisted in community relations and public participation meetings. ENVIRON also coordinated state and federal regulatory requirements pursuant to TSCA and the Massachusetts Contingency Plan. Our team directed human health and environmental risk characterizations and remedial activities for the site. ENVIRON personnel achieved a Response Action Outcome in a timely manner so that school operations were not impacted during the academic year.

Indoor Air Quality Sampling | New York City, NY

ENVIRON staff performed indoor air quality (IAQ) sampling in eight separate Skyscrapers surrounding the "Ground Zero" site and financial district in New York City (Wall Street and Broadway) for asbestos, lead, chromium, hexavalent chromium, particulates, dioxin, PCBs, benzene and volatile organic compounds. ENVIRON drafted separate IAQ reports and discussed findings with client representatives.

Environmental Assessment & Material Management

PCB State of Knowledge Review | Building Products

ENVIRON was retained by a manufacturer of building products to evaluate the state of knowledge relating to historic environmental and workplace exposures to PCBs. The evaluation was conducted to provide technical support to a litigation proceeding regarding alleged exposure of building occupants who were allegedly exposed to PCBs in a plastisol (PVC) coating on ceiling tiles that were installed in a college building in New Jersey. The evaluation was provided in an expert report and subsequent deposition testimony, which assisted the client in settling the matter.

Environmental Exposure Assessment | New York University

ENVIRON evaluated environmental exposures for New York University (NYU) and Hospital for Joint Diseases (HJD). ENVIRON gathered information on NYU's and HJD's management practices for a variety of wastes including medical waste, hazardous waste, asbestos waste, low-level radioactive waste, and general solid waste. ENVIRON also performed a review of NYU's activities (USTs, air emissions, PCBs, pesticides and herbicides, wastewater discharges) in order to identify whether other potentially significant areas of environmental exposure were present. ENVIRON evaluated the regulatory status of all off-site waste disposal facilities used by NYU and HJD and estimated the magnitude of potential liabilities associated with use of these facilities.

Emergency Response Oversight | California

ENVIRON provided oversight of an emergency situation due to a fallen utility pole damaging a residential property. ENVIRON's oversight included sampling and characterizing the PCBs in the transformer and inside the residential property, as well as collecting post-remediation confirmation samples.

PCB Fingerprinting | West Coast Industrial Urban Waterway

In a CERCLA cost recovery litigation case, ENVIRON provided expert testimony and technical support to a client who owns an industrial facility located adjacent to a tidal waterway where elevated PCB concentrations have been observed in sediments. ENVIRON reviewed and analyzed PCB aroclor concentrations in sediments and in samples of soil and other media at upland locations. Potential PCB sources included air compressors, concrete caulking, waste oil-fired boilers, transformers, and hydraulic equipment. We identified specific aroclors likely to be used in each of these applications. We also evaluated several potential pathways, such as sewers, overland flow, and drainage ditches, from upland sources to the waterway. By analyzing aroclor data from sediments and potential upland sources and evaluating pathways for PCBs to reach the waterway, ENVIRON demonstrated that the client's upland industrial facility could have contributed only minimally to PCBs in the waterway sediments. As a result of our analysis and technical discussions during mediation, the client successfully negotiated a settlement, avoiding costly litigation discovery and trial.

PCB Source Identification | Ohio Paper Mill

ENVIRON provided expert testimony in a litigation case regarding a secondary paper mill and associated waste disposal areas located in two Ohio towns. Operations at the former paper mill dated back to the late 1800s, and included recycling of carbonless copy paper containing PCBs. ENVIRON utilized fingerprinting of PCB aroclor data to confirm that PCB contamination originated from historical operations and sludge disposal practices associated with the various paper manufacturing and recycling processes conducted at the mill.

Risk Assessment and CERCLA Cost Allocation | Texas Superfund Site

ENVIRON provided technical support to the PRP group at a Superfund site in Texas that had operated as a commercial waste disposal facility from the 1950s and included a 12-acre lagoon that had received various waste materials including PCBs. ENVIRON conducted an evaluation of the impact of PCBs on the baseline risk assessment for the facility and the extent to which the costs of the proposed remedy were impacted by the presence of PCBs. ENVIRON's findings were presented in an expert report and were used to assist in the negotiation of the allocation of response costs for the site.

Public Outreach Support | Ford Motor Company

ENVIRON conducted risk assessment and provided public outreach support to Ford Motor Company in response to issues associated with recycling of concrete that was contaminated with PCBs.

PCBs in Fluorescent Lighting | Assistance to Urban School System

ENVIRON staff worked with a confidential client to evaluate potential exposure to PCBs fluorescent lighting within an urban school setting. The assessment included analysis of an EPA risk assessment tool for PCBs to determine representativeness for the exposure situation under consideration. ENVIRON staff then worked with the project team to derive a protective short-term action level for indoor air at the schools during remedial measures.

Confidential Big Box Developer | MA

ENVIRON conducted an extensive field characterization program when it was confirmed that PCB-containing paint coated on concrete, remained in place in concentrations exceeding 1,500 ppm. Cost estimates and remedial plans, formulated in consultation with US EPA Region I TSCA staff, were prepared and will be implemented in Fall 2012. Remedial Action Plans in accordance with MassDEP requirements are also being prepared.

Public Agency | Central MA

Conducted a hazardous waste assessment of PCB-impacted construction materials and soil prior to reconstruction activities to be conducted at a dam. Budgeting and drafting of task orders was performed, as well as the drafting of MCP submittals. ENVIRON personnel collected over three hundred soil, sediment, concrete, efflorescence, caulking and wipe samples for PCB analysis. Data was compiled and tabulated for integration into a worker-exposure risk assessment, which was disseminated to agency employees. A concrete sampling protocol was developed and implemented for horizontal surfaces, which was provided to the client and was approved by the United States Environmental Protection Agency Region 1.

Environmental Media | Industrial Aerospace Client, CT

ENVIRON staff completed $IM pre-design investigation activities as part of a RCRA cleanup. Pre-design investigations were conducted at five separate areas involving 15,000 cubic yards of PCB-contaminated soil including Geo-Probe sample collection, immunoassay PCBs field screening, data validation, data evaluation and report preparation. Drawings of site utilities and engineering estimates of contamination quantities were also prepared. Construction is anticipated to involve excavation of soils to an EPA-approved landfill, and site restoration. ENVIRON also prepared the first Land Use Application in EPA Region I to change the existing land use classification from residential to industrial, in support to a risk assessment.

Redevelopment Parcel | Raynham, MA

The site is approximately 26 acres and was previously utilized as a driving range and par 3 golf course. During the process of construction of a new retail store for a national client, buried concrete debris was encountered at depth with a painted surface. Upon testing of the paint, PCBs were detected at concentrations up to approximately 1,500 ppm, triggering EPA and MassDEP regulatory requirements.

Extensive soil, concrete and paint chip sampling was performed by ENVIRON to define the nature and extent of PCB contamination. The extent of the PCB- impacted soil and concrete has been confirmed to be approximately 1 acre in size. A Notification and Request for Approval, Modified Self-Implementing Onsite Cleanup and Disposal of PCB Bulk Product Waste and PCB Remediation Waste Plan is tentatively scheduled for submittal to EPA in May 2013 in accordance with 40 CFR 761.61(a) and (c). Remediation, which will entail excavation of approximately 9,000 cubic yards of soil/concrete for offsite disposal, is tentatively scheduled for summer 2013. Total remediation costs are estimated at over $4 million.

Confidential Big Box Developer | Warwick, RI

The site is approximately 9 acres and was previously utilized as a retail discount warehouse. During the process of construction, buried debris (tanks, electrical equipment, boiler, etc.) was encountered, mixed in with the fill material. Upon collecting soil samples for disposal parameters, PCBs were identified at concentrations exceeding 50 ppm, triggering EPA and RIDEM regulatory requirements. Extensive soil sampling was performed at the site in accordance with 40 CFR 761 Subpart N to define the nature and extent of PCB contamination. PCB concentrations in the soil ranged up to approximately 1,100 ppm. A Notification and Request for Approval, Modified Self-Implementing Onsite Cleanup and Disposal of PCB Remediation Waste Plan was submitted to EPA in March 2013 in accordance with 40 CFR 761.61(a) and (c), and EPA/RIDEM approval is anticipated in June 2013. Remediation, which will entail excavation of approximately 5,000 cubic yards of soil for offsite disposal, is tentatively scheduled for summer 2013. Total remediation costs are estimated at over $2 million. ENVIRON saved client approximately $1 million by negotiating with EPA to allow for additional sampling of stockpiles, which were confirmed to be <50 ppm in concentration.

Public Agency | Central MA

Conducted a hazardous waste assessment of PCB-impacted construction materials and soil prior to reconstruction activities to be conducted at a dam. Budgeting and drafting of task orders was performed, as well as the drafting of MCP submittals. ENVIRON personnel collected over three hundred soil, sediment, concrete, efflorescence, caulking and wipe samples for PCB analysis. Data was compiled and tabulated for integration into a worker-exposure risk assessment, which was disseminated to agency employees. A concrete sampling protocol was developed and implemented for horizontal surfaces, which was provided to the client and was approved by the United States Environmental Protection Agency Region 1.

Confidential Client | Plainville, MA

ENVIRON conducted the inventory, segregation, and removal of packed waste consisting of contaminated decommissioning materials such as soils, concrete scrabble, concrete debris, piping, PPE and other disposable materials from a radioactive material storage area. Our team oversaw the transportation for offsite disposal of approximately 123 tons of soil/debris contaminated with low concentrations (up to 4%) of enriched uranium at the US Ecology disposal facility in Grand View, Idaho. ENVIRON also provided program management and oversight of the project radiological and occupational health program and aided in directing the packaged waste transfer operations in accordance with an approved Transportation and Security Plan. Waste packages were sorted into four (4) waste stream categories based on radiological and chemical (cadmium and PCBs) constituents acceptable for receipt at the disposal site in accordance with Waste Acceptance Criteria (WAC).

Appendix B

Résumés of Key Personnel

Carol L. Serlin, PG | Principal

Irvine, California
+1 949 261 5151 | cserlin@environcorp.com

Carol Serlin has over 30 years of experience in the assessment and remediation of industrial, manufacturing, aerospace, petroleum, electronics and waste disposal sites in the western US. She has directed remedial investigations to assess hydrogeologic and geochemical conditions, conducted feasibility studies to evaluate appropriate remedial solutions and successfully implemented remedial measures to address a variety of chemicals in indoor air, soil, soil gas, surface water and groundwater. In addition, Carol has provided technical expertise in the areas of environmental risk management, environmental auditing and compliance, due diligence reviews and litigation support; consulted in insurance recovery cases involving soil and groundwater contamination; and provided allocation assistance to responsible parties in multi-party merged-plume situations.

EDUCATION

1984	MS, Hydrology & Water Resources, University of Arizona
1979	BS, Geology, Bucknell University

EXPERIENCE

- Directed investigation and remediation of an approximately 450-acre former industrial and test facility in southern California under a DTSC Consent Order, which was issued to multiple parties. Operated on behalf of all parties to address soil, soil gas and groundwater contamination to allow future development of the site. Contaminants of concern included chlorinated solvents, PCBs, perchlorate, NDMA, and metals in alluvium and fractured granitic bedrock. Interacted with various consultants, regulatory and public officials, including USEPA, DTSC, RWQCB, and SCAQMD, and the general public, including the local school district. Provided briefings to interested parties on an ongoing basis during the course of the investigation/remediation. Oversaw the RI, FS, quarterly sampling, public participation, aquifer testing, interim remediation, human health and ecological risk assessment, and indoor air evaluations/mitigation. Interim remedial actions consisted of soil excavation, soil vapor extraction, oxidant injection into ground water (ISCO), dual-phase ground water extraction, and design/construction/operation of a hydraulic control system to address off-site migration of impacted ground water. Used isotope analysis to help document remedial effectiveness. Achieved unrestricted closure for approximately 200 acres. Final RAP includes additional remediation of certain areas using phytoremediation, reductant injection into groundwater (ISCR), in-situ thermal desorption (ISTD), and ISCO.
- Designed and implemented ISCO remedial approaches to address VOCs in groundwater at several locations at a site in Riverside County, California. Prepared site conceptual model and remedial plans for approval by DTSC. In one area injected sodium permanganate via fixed wells into fractured granitic bedrock. In a second area, used potassium permanganate, which was infiltrated into groundwater via an 100-foot long infiltration trench. Used conventional monitoring and isotope analyses to demonstrate destruction of VOCs.
- Developed and directed a remedial investigation/feasibility study for a responsible party that operated at a former industrial site in the San Fernando Valley. Contaminants of concern included VOCs, petroleum hydrocarbons, metals, PCBs, 1,4-dioxane, and hexavalent chromium. Used decision analysis techniques to assist in evaluation of options for investigation and site restoration. Assisted the client in its claims against insurance companies, Superfund actions, and with litigation against neighboring property owners. Served as "un-biased reviewer" for multi-party on-site remediation comprised of slurry wall, soil vapor extraction, and dual-phase extraction. Currently conducting investigations and remedial planning for hexavalent chromium and 1,4-dioxane underlying the site via field pilot-scale studies.

- Directed remedial investigation of a former industrial site in Alhambra, which is located within the Alhambra OU. Contributed to overall strategy regarding identification of responsible parties and interaction/negotiation with USEPA and the RWQCB. Developed and conducted soil, soil gas, and ground water investigations in merged plume situation to attempt to quantify client's contribution to overall plume. Contaminants of concern include CVOCs and 1,4-dioxane. Supervised vadose zone and ground water modeling efforts. Currently evaluating remedial options for soil and ground water.
- Served as a third-party technical reviewer on behalf of a property owner at a former NASA facility located in southern California. Provided strategic support for property owner, which owns a retail facility constructed at the site, and is not responsible for remediation. Remediation is being conducted via SVE and in-situ molasses injection. Reviewed and commened on key reports including RAPs and risk assessments, participate in stakeholder meetings, evaluate indoor air issues, and assess potential off-site impacts to the retail center.
- Directed investigation and remediation of multiple sites in southern California and achieved regulatory closure from the RWQCB, DTSC and local agencies. Conducted investigations of soil, soil gas and shallow ground water, evaluated potential for vapor intrusion at some sites, assessed potential health risks, and developed and implemented RAPs and closure reports. Remediation accomplished through various techniques such as soil excavation, soil vapor extraction, ISCO (ozone and permanganate), dual-phase extraction, monitored natural attenuation, and enhanced monitored natural attenuation.
- Supervised a RCRA-Corrective Action Program at a closed Class I landfill in Southern California. Prepared various work plans and investigative reports as required by a RCRA Corrective Action Order and conducted investigations of soil gas, sediment, soil and ground water. Developed leachate removal program. Conducted statistical analysis of historic ground water data for risk assessment. Interfaced with the client and USEPA to identify a cost-effective scope of work, acceptable to both parties. Supervised preparation of a RCRA audit checklist for the landfill, which was reviewed and approved by DTSC. Supervised implementation of the audit program. Currently supporting off-site investigations and planning for IAQ evaluations.
- Assisted in development of liability allocation approaches and presentations for private sector clients at several Superfund locations in California. Developed and documented allocation approaches, including novel approaches as well as traditional approaches using the Gore factors. Prepared exhibits for, and participated in, arbitration and mediation sessions.
- Served as a third party reviewer at several large manufacturing sites in the western United States. Reviewed the technical aspects of RCRA Corrective Action programs, and proposed work and budgets; and interacted with the regulatory agencies. Provided technical review of remedial investigation reports prior to submittal to the RWQCB, DTSC, and USEPA. Served as client's in-house project manager at one facility under RCRA Corrective Action for a period of six months after facility manager resigned. Responsibilities included schedule and budget management, technical oversight, and supervision of consultants.
- Supervised and conducted environmental compliance audits at active manufacturing facilities, including food processing facilities, agricultural product, coatings, electronics, aerospace, plastics, steel, and rubber manufacturing plants, oil terminals and refineries, nuclear equipment repair facilities, and medical care facilities to assess compliance with applicable environmental regulations, and to evaluate soil and ground water conditions. Audits were conducted prior to facility purchase, sale or refinancing to identify and quantify cost factors related to characterization, environmental regulatory compliance (e.g., air, wastewater, safety, hazardous materials/waste), and remediation. Used uncertainty analyses to quantify costs. Helped facilities address identified compliance issues.
- Directed and conducted numerous due diligence assessments of commercial and industrial facilities throughout the western United States. Assessments ranged from single sites to large portfolios and were conducted on behalf of

purchasers, sellers, financial institutions and pension funds. Assessments complied with applicable ASTM standards. Depending on the scope of the assessment, also evaluated asbestos, lead-based paint, radon, and mold. For certain clients, included a quantification of environmental risk associated with the asset to help in evaluating purchase or sale pricing.

- Facilitated redevelopment of a variety of former industrial and agricultural properties in southern California. Provided expertise in due diligence, subsurface investigations, and supported EIR preparation and mitigation development. Participated in community outreach and City Council meetings. Developed responses to public comments. Supervised preparation and implementation of soil management plans, evaluation of grading operations including imported soil, and field monitoring activities. Assisted in development and presentation of human health and ecological risk assessments. Assisted in negotiations with potential tenants.
- Functioned as program manager for a rotating compliance auditing programs conducted on behalf of a multi-national corporations. Assessed the corporation's US-based manufacturing facilities, which are located throughout the country. Conducted annual compliance audits at specified facilities to evaluate both areas of good practice, improved practice, and identify compliance issues. Covered environmental compliance, including regulatory compliance as well as energy use. Quantified potential liability associated with areas on non-compliance and ranked severity of issues. Worked with facilities to develop schedules and programs to address identified issues. Provided assistance in development of facility EMS.
- Provided technical litigation support at numerous locations in the Southwest where the occurrence, source, toxicity, and age of chlorinated solvent and/or petroleum hydrocarbon releases were an issue. Reviewed the results of previous investigations, compiled and interpreted geologic, hydrogeologic, and geochemical data, evaluated investigative and remedial costs, and conducted analytical ground water modeling to support theories. Provided technical support during arbitration proceedings through estimation of investigation/remediation costs, and evaluation of the necessity of expenditures to date.
- Conducted a RCRA facility inspection of a closing manufacturing facility in Los Angeles County to identify SWMUs. Identified approximately 50 SWMUs. Prepared an assessment report for internal use as a basis for agency negotiation.
- Provided due diligence reviews for numerous sites in the western U.S. where chlorinated solvents, petroleum hydrocarbons, metals, PCBs, and emergent chemicals had been released to soil and/or ground water. Reviews were conducted in order to assess site status, and evaluate cost of investigation/remediation conducted to date. Reviews were also conducted to assess effectiveness of operating remedial systems, and necessary changes were recommended.

Prior to joining ENVIRON, Carol held the following positions:

- Associate Hydrogeologist, Harding Lawson Associates, Tustin, California
  - Directed a RCRA inspection of a facility to identify and locate all solid waste management units (SWMUs) on site. Assessed potential pathways for human exposure from each unit. Identified 90 SWMUs during a 5-day site inspection. Prepared a RCRA Facility Assessment report and recommended further investigation as necessary.
  - Developed and supervised a ground water basin investigation for a small canyon watershed to determine the sustained safe yield of the aquifer. Tasks included field mapping, stream gaging, production well design and installation, step-drawdown tests, aquifer tests, and computer simulation to evaluate long-term yield.
  - Served as field operations manager for a siting study at Arizona's first hazardous waste management facility. Directed field program and field personnel during drilling and installation of wells over 1,000 feet deep; continuous geological coring; geophysical logging; well development and sampling. Faults detected in the

subsurface complicated the hydrogeologic regime. Interfaced with EPA, Region IX, and the Arizona Department of Water Resources to prepare a license application.

- Developed and directed a leak detection and monitoring program for a tank farm with 20 tanks, including a remedial investigation to evaluate the distribution of solvents in the layered aquifer. The investigation employed soil gas sampling, cone penetrometer and HydroPunch, well installation/sampling and aquifer testing. Participated in tank removal and reinstallation of double-walled tanks. Initiated a quarterly ground water quality monitoring and reporting program. Installed an interim ground water remediation system.
- Inspected a closed landfill site to determine compliance with Subchapter 15 monitoring requirements. Reviewed closure plan, and developed a ground water, vadose zone, and surface water monitoring plan to bring the facility into compliance with Subchapter 15 and AB 3525 requirements. Coordinated with Regional Water Quality Control Board (RWQCB) to obtain plan approval and implement plan.
- Supervised and implemented a detection monitoring and verification monitoring program to evaluate hexavalent chromium in a layered alluvial aquifer at a RCRA facility with multiple point sources. Study included use of geophysical techniques to define subsurface geology and locate contaminant plumes, well installation, aquifer testing, and soil/ground water sampling, initiated a quarterly ground water quality sampling and reporting program for key wells. Coordinated with local RWQCB, DTSC, and facility personnel.
- Directed site assessments at three facilities to evaluate the distribution of hydrocarbons and chemicals in soil and ground water. Conducted site inspections, employee interviews, surface geophysical investigations, installation of wells and borings, and ground water and soil sampling and analysis. Prepared workplans, quality assurance plans, and final engineering reports.
- Served as technical manager for California's Low Level Radioactive Waste (LLRW) Siting Study. Responsibilities included reviewing and approving the scope of technical work, and coordinating and supervising field personnel. Technical tasks included performing ground water modeling and geologic mapping, overseeing well installation, and conducting an aquifer evaluation. Also performed geochemical sampling and age-dating of soil and ground water; used heat dissipation probes, thermocouple psychrometers and neutron probe access hole logging to evaluate and monitor the vadose zone; and completed geologic coring. Coordinated with the Department of Health Services (DHS), the Bureau of Land Management, and local agencies, and citizens' groups.
- Supervised all aspects of a remedial investigation and feasibility study at a closed solvent repackaging facility under a DTSC consent order. The investigation phase included evaluating community relations, directing the subsurface investigation, conducting risk assessments, and overseeing underground tank removal, facility demolition, and remedial action. Coordinated closely with DHS, SCAQMD, and the local fire department.

- Project Geologist, Ecology and Environment, Inc., San Francisco, California
  - Designed and implemented a ground water and vadose zone contaminant migration study at a Class I landfill under USEPA oversight. Studies included electromagnetic-conductivity surveys to define subsurface inorganic contamination, soil gas sampling, monitoring well design and installation, aquifer testing, soil and ground water sampling, plume characterization and migration studies, runoff evaluation, water balance determination, and environmental fate analyses.
  - Supervised and implemented supplemental remedial investigation involving installation, sampling, and testing of 13 nested wells at a Class I landfill containing inorganic and organic soil and ground water contamination. Developed bid specifications, a quality assurance/control plan, a field-operating plan, a sampling plan, and a safety plan. Worked in level B protection. Coordinated closely with federal, state, and local officials and with consulting firms representing responsible parties.

  - Conducted a soil and ground water quality investigation adjacent to a landfill to confirm suspected off-site leachate migration. Program included installing clustered, depth-specific monitoring wells to 1,200 feet, geologic coring, and installation of lysimeters, ground water and soil pore water sampling, aquifer testing, and data analysis. Methane and vinyl chloride exiting borings often caused potentially explosive conditions. Worked closely with federal and local officials to direct the field program and provide input to a public information campaign.
  - Designed and implemented a ground water monitoring program to evaluate the presence of dioxin and pesticides in soil and ground water. Assessed directional effects of prolonged agricultural ground water extraction on ground water flow system. Installed, sampled, and tested monitoring wells; conducted preliminary geologic mapping; and developed a geologic and hydrologic conceptual model of the site.
  - Supervised an investigation performed by consultants to potentially responsible parties, at a site containing pentachlorophemol and creosote. Provided third-party review for USEPA Region IX. Reviewed remedial investigation plans and reports, supervised field activities, and approved monitoring/extraction well locations and design. Worked closely with federal and local officials to gain community support.
  - Directed an investigation of a multiple aquifer system to determine the extent of volatile organic chemical contamination resulting from a combination of industrial sources including leaking tanks, hazardous waste storage areas, and dry wells. Initiated a well canvassing program to identify and repair cascading wells to prevent contamination of deeper aquifers. Designed monitoring wells and interception wells. Participated in a multi-agency committee responsible for directing the soil and ground water investigation, installing over 50 wells from 150 to 900 feet, and developing a 3-D ground water flow/solute transport model capable of evaluating the alluvial system.

- Staff Geologist, Woodward-Clyde Consultants, San Francisco, California
  - Conducted a hydrogeologic and geochemical evaluation of the Paradox Basin to determine its suitability as a potential high-level nuclear waste repository. Performed aquifer tests, tracer tests, brine sampling, drill-stem tests, and interval packer tests. Conducted aquifer testing of an approximate 6,000-foot deep well. Sampled springs in the Colorado River to evaluate the geochemical relationship between geologic units in the Paradox Basin that also outcropped in the Grand Canyon.

CREDENTIALS

Registrations and Certifications

Professional Geologist: California, Arizona, and Oregon

Certified Professional Geologist, AIPG

Professional Affiliations and Activities

Member, Association of Ground Water Scientists and Engineers.

PUBLICATIONS & PRESENTATIONS

Rowe, Devon, and Serlin, Carol. 2009. "Use of Carbon Isotope Ratios to Monitor Effects of In-Situ Chemical Oxidation of TCE in Ground Water." Platform presentation at The 19th Annual AEHS Meeting and West Coast Conference on Soils, Sediments and Water, March 9-12, 2009.

Jones, Tony, Serlin, Carol, and Escobar, Mauricio. 2009. "Prevalence and Persistence of Hexavalent Chromium During In-Situ Chemical Oxidation of Trichloroethene with Permanganate." Platform presentation at The 19th Annual AEHS Meeting and West Coast Conference on Soils, Sediments and Water, March 9-12, 2009.

Achour, Farid, and Serlin, Carol. 2008. "Wavelets and Spectral Analysis, Powerful Tools for Estimating Aquifer Hydraulic Parameters without Removing Water." Platform presentation at The 24th International Conference on Soils, Sediments, Water and Energy, October 20 -23, 2008 (UMass).

Jones, Tony, Serlin, Carol, and Escobar, Mauricio. 2008. "Assessing Sources of Hexavalent Chromium during In-Situ Chemical Oxidation of Trichloroethene with Permanganate." Platform presentation at The 6th International Conference on Oxidation and Reduction Technologies for In-Situ Treatment of Soil and Groundwater, September 22-25, 2008.

Escobar, Mauricio, Serlin, Carol, and Jones, Tony. 2008. "Evaluation of the Effects of ISCO on TCE-Impacted Ground Water in Weathered Granitic Mass." Platform presentation at The 6th International Conference on Oxidation and Reduction Technologies for In-Situ Treatment of Soil and Groundwater, September 22-25, 2008.

Marr, Alex, Sutarwala, Seema, and Serlin, Carol. 2008. "Development of a Conceptual Site Model for Contaminant Hydrology in Fractured Granitic Terrain." Platform presentation at The Second International Conference on Contaminated Fractured Rock: Characterization and Remediation, September 25, 2008.

Achour, Farid and Serlin, Carol. 2008. "Optimization of Remediation in Fractured Media Using Spectral Analysis." Platform presentation at The 18th Annual AEHS Meeting and West Coast Conference on Soils, Sediments and Water, March 10-13, 2008.

Serlin, C.L., and G.E. Bloom. 1997. "Pre-remedial Characterization of the Unsaturated Zone Using Point Permeability Testing" (abstract and presentation). The Seventh West Coast Conference on Contaminated Soils and Groundwater, March 1997, Oxnard, California.

Serlin, C.L, and L.M. Kaplan. 1996. "Field Comparison of Micropurge and Traditional Ground Water Sampling for Volatile Organic Compounds." in Proceedings of the 1996 Petroleum Hydrocarbons & Organic Chemicals in Ground Water, Prevention, Detection, and Remediation Conference, November 13-15, 1996, Houston, Texas.

Hanrahan, T., J. Ench, C.L. Serlin, and C. Bennett. 1988. "Site characterization Quality Assurance for the California Low Level Radioactive Waste Disposal Site Project." In Proceedings of the Waste Management Symposium, February 28-March 3, 1988, Tucson, Arizona.

Farshad Razmdjoo | Managing Principal

Irvine, California
+1 949 798 3609 | frazmdjoo@environcorp.com

Farshad Razmdjoo is the Managing Principal of ENVIRON's Southwest operations. He has over 25 years of experience in environmental consulting and engineering. Farshad currently manages a vast variety of consulting projects, including real estate and merger and acquisition due diligence, tenant environmental audits, environmental, health and safety audits, property decommissioning and redevelopment, remedial investigations, remedial action design and implementation, regulatory agency interaction, asbestos management programs, radon surveys, mold investigation and remediation programs and evaluations of lead in drinking water. In addition, he has developed and managed an environmental risk-management program for a major real estate investment trust. Farshad is highly experienced in working with federal and California environmental regulations and has a working knowledge of many other state and local regulatory requirements and agencies throughout the United States. Much of Farshad's past and current projects involve assessing environmental issues at commercial and industrial facilities throughout the North America, Europe, China and India. For the past 17 years at ENVIRON, Farshad has managed projects for representatives in real estate development companies, insurance companies, financial institutions, pension funds, institutional investors, real estate investment trusts, aerospace companies, industrial and manufacturing companies and law firms..

EDUCATION

1981 BS, Civil Engineering, Thames Polytechnic, London, England

EXPERIENCE

- Acted as point of contact and responsible Principal for several national real estate and development clients with properties throughout the United States. He has completed over 500 assignments supporting the client in acquiring, managing, and disposing over 300 properties. Many of these assignments were undertaken and successfully completed under extreme time constraints.
- Managed over 20 international multi-site environmental assessments at over 100 industrial, manufacturing, and commercial facilities as a part of M&A environmental due diligence. These included evaluation of aerospace component manufacturing facilities, automotive manufacturing and distribution facilities, medical device manufacturing facilities, telecommunication facilities, and hardware store facilities. Work plans and subsequent Phase II soil and ground water investigations were also completed for many of those assignments.
- Developed and managed an environmental risk management program for a major real estate investment trust (REIT). This REIT contained over 100 properties with 200 tenants with biotechnical operations throughout the western and eastern United States. As part of the environmental risk management program, an asbestos management program, a moisture intrusion and mold prevention response (MIMPR) program, and a tenant environmental audit (TEA) program were developed and implemented. A mold prevention and response plan, as outlined in the MIMPR, was prepared and implemented. More than 50 tenant exit audits for tenants vacating the properties were conducted in accordance with the TEA. An overall tenant environmental audit program has been developed. This entire set of programs are supported by an overarching training program focused on giving asset managers and building engineers the tools required to implement all of the components of the environmental risk management program.
- Managed the redevelopment of a former aerospace manufacturing facility into a retail shopping center with stores, restaurants, hotels, and an office park. The 107-acre site was contaminated with volatile organic compounds, petroleum hydrocarbons, and metals. A due diligence environmental assessment of the site was

successfully completed enabling the buyer to overcome the liabilities associated with the soil and ground water contamination. The scope of work included the preparation of a Phase I ESA, review of existing soil and ground water investigations, evaluation of potential health risk issues for the future occupants, risk communication with future tenants and their consultants, peer review of the Environmental Impact Report, and an on-site monitor to perform oversight during construction activities at the site. The site was successfully developed ahead of schedule.

- Managed the decontamination and decommissioning of a former biopharmaceutical research facility. A detailed survey of over 250 rooms was conducted, and radiological materials, hazardous chemicals, and potentially biologically hazardous substances were identified. Upon completion of the decontamination/decommissioning, the entire facility was cleaned and prepared for re-occupancy. Throughout the decommissioning process, ENVIRON worked closely with State regulatory officials to demonstrate that all cleanup activities were in compliance with applicable regulations.
- Managed a remedial investigation/feasibility study (RI/FS) using CPT/HydroPunch and Geoprobe techniques, with installation of multi-level ground water monitoring wells, evaluation and selection of a remedial alternative, and design and preparation of an interim remedial action plan for remediation of soil and ground water contaminated with dense non-aquas phase liquid (DNAPL) at a former manufacturing facility in Oxnard, California. The first phase of remediation included the excavation and placement of approximately 11,000 cubic yards of impacted soil into vapor extraction cells for on-site treatment. Soil vapor and vertical and horizontal ground water extraction systems were installed. The vapor and ground water treatment systems included air stripping, ultra violet oxidation, and vapor and liquid granulated activated carbon. All work was conducted under direct and on-site regulatory oversight of California Regional Water Quality Control Board (RWQCB) – Los Angeles Region and Ventura County Air Pollution Control District.
- Managed a remedial investigation at a California Superfund site in Los Angeles County. The site was under a consent order from Cal-EPA Department of Toxic Substances Control (DTSC) at the time. The project involved performing RI/FS, conducting human health and ecological risk assessments, and preparing a remedial action plan.
- Managed Phase I and II site assessments and estimation of remediation costs of six manufacturing plants in Costa Mesa (Orange County), Perris (Riverside County), Ontario (San Bernardino County), Somerton (Arizona), Alliance (Ohio), and Winter Heaven (Florida).
- Managed a ground water investigation program at a former electronics manufacturing plant in Santa Ana, California. This included installation, development, and sampling of shallow ground water monitoring wells and evaluation and interpretation of hydrogeological and analytical data. The investigation was performed under the regulatory oversight of the RWQCB - Santa Ana Region.
- Managed the preparation of a sampling and analysis plan evaluating the nature and extent of soil and ground water contaminated with tetrachloroethene (PCE) at a dry cleaning facility in Santa Ana, California. ENVIRON obtained closure for the site from RWQCB-Santa Ana Region.
- Managed, reviewed, and evaluated numerous Phase I and II reports associated with the acquisition of a 500-acre industrial park in Spokane, Washington. Prepared a report of findings including conclusions and recommendations for the review by the client.
- Managed litigation support services related to the fate and transport of organic compounds in soil and ground water, appropriate remedial alternatives, and cost associated for two facilities in southern California. The results of the evaluations were successfully used as part of the settlement negotiations with the opposing parties.
- Designed and managed a site investigation program to evaluate the nature and the extent of soil contaminated with PCE at a dry cleaning facility in Aliso Viejo, California. Based on the results, several remedial alternatives

were evaluated and a risk assessment was performed. Based on the results of a preliminary risk assessment, site closure was obtained from the Orange County Health Care Agency.

- Conducted and supervised geotechnical investigations in the United States, the United Kingdom, and the Middle East. Responsibilities have included the supervision and coordination of geotechnical field and laboratory testing, logging of borings for geotechnical drilling programs, and soil sampling. Experience in supervising foundation construction.
- Representative civil and geotechnical involvements include:
  - Installed pad and strip foundations in London clay.
  - Evaluated changes to designs and drawings for a multi-unit housing development in the greater London metropolitan area.
  - Conducted drilling inspections and field laboratory testing for a manufacturing facility in Iran.
  - Assisted in a review of geotechnical data for the foundation of a proposed prison in southern California.
  - Supervised field activities for several foundation investigations in southern California.

Prior to joining ENVIRON, Mr. Razmdjoo held the following positions:

- Regional Manager and Senior Project Manager, Applied Geosciences Inc., Irvine, California. Work included due diligence related to real estate transactions, as well as several major remedial investigation projects in which he identified the remedial action alternatives for both degraded soil and ground water sites. These sites were impacted with a variety of compounds such as petroleum hydrocarbons, chlorinated solvents, and/or heavy metals. Representative management experience included the following:
  - Managed a program involving numerous Phase I environmental site assessments, consequential subsurface investigations, and, where appropriate, remediation monitoring for a nationally known food service company with facilities throughout the western and midwestern United States.
  - Managed a project in southern California that included evaluating remedial alternatives, development of remedial action plans and feasibility studies, and implementation of vapor-extraction systems for several sites contaminated with petroleum hydrocarbons and chlorinated solvents.
  - Managed and conducted numerous remedial investigations in response to orders as part of the San Gabriel and San Fernando Ground Water Basin Superfund programs.
  - Managed the development and implementation of an aeration treatment program for soil contaminated with petroleum hydrocarbons at a site in southern California.
  - Managed the installation of ground water monitoring wells and vadose-zone monitoring instrumentation for a vapor-extraction system research study conducted jointly with a major oil company.
  - Managed the supervision and monitoring of the in situ treatment and remediation of petroleum products released into the soil from underground storage tanks. The in situ treatment included steam stripping and oxidation techniques.
  - Managed and executed numerous ground water investigations throughout the western United States.
  - Managed and implemented investigations and removal of more than 100 underground storage tanks and clarifiers.
  - Managed and participated in asbestos surveys and resultant abatements or management plans.

  - Managed and conducted hundreds of projects involving "due-diligence" searches for commercial and industrial real estate transactions.
  - Managed investigations, remediation, and development of several former oil-field facilities.
  - Managed the compilation and assessment of ground water data for a lawsuit involving the storage and disposition of hazardous materials for a Class I hazardous waste landfill.
  - Managed the preparation of statistically-based random sampling plan for collecting soil samples from approximately 15,000-cubic yards of stockpiled soil and associated excavation in Los Angeles County that was potentially contaminated with DEA. The soil was consequently spread and a bioremediation program was implemented. Following the bioremediation, the degraded soil was randomly sampled and, based on the results, excavation was backfilled with the remediated soil.
- Engineer, Riserite Construction & Consulting Engineers Ltd., London, England
- Site Engineer, Tehran Berkeley Soil & Environmental Engineers, Tehran, Iran

CREDENTIALS

Professional Affiliations and Activities

Orange County Bar Association (Adjunct Member)

Los Angeles County Bar Association (Adjunct Member)

The Association for Environmental Health & Sciences

National Association of Industrial & Office Properties

Eric S. Wood, PHg, PG, LSP | Principal Consultant

Westford, Massachusetts
+1 978 449 0343 | eswood@environcorp.com

Eric S. Wood has over 25 years of experience in environmental science and hydrogeology, with particular emphasis in the areas of litigation support, site investigation and remediation, environmental forensics, insurance support, due diligence, redevelopment of industrial properties, and environmental compliance. He is frequently retained to help clients integrate environmental solutions with their short-term and long-term business objectives.

EDUCATION

1986 MS, Hydrology, University of New Hampshire

1982 BA, Environmental Science, University of Massachusetts

EXPERIENCE

Phase I Environmental Assessments and Environmental Due Diligence

- Assisted counsel and large industrial clients with environmental due diligence assessments by quantifying environmental risk associated with acquiring new companies and properties and divesting of property. Experience includes providing in-depth environmental and operational audits of facilities, as well as estimating costs associated with environmental liabilities, permits, capital expenditures, operational expenses, construction, closure and post-closure. Conducted site inspections and file reviews, reviewed facility compliance with applicable environmental permits and regulations, reviewed facility design and operations, identified potential environmental and operational liabilities, prepared cost estimates and timelines for environmental operations and remediation, and interviewed state and federal regulators. Experienced with transactions ranging from small businesses to multi-million dollar industrial and commercial concerns.
- Conducted and directed environmental compliance audits for industry and commercial businesses involving applicable state and federal regulations. Most recently, directed a large scale compliance audit for a national corporation at multiple facilities (more than 80) nationwide in multiple states (simultaneously) within a very compressed timeframe. Developed a stream-lined approach for conducting site visits and collecting the relevant data. Applicable regulations included the Clean Water Act, the Resource Conservation and Recovery Act, the Clean Air Act, the Emergency Planning and Community Right to Know Act, and state and local regulations and bylaws. Rendered opinions on environmental compliance of multiple RCRA-regulated facilities in all USEPA regions of the United States with RCRA and HSWA. Conducted all site investigations, audit interviews, environmental media evaluation and reporting.
- Retained to provide third party review of other professional's scopes of work, data acquisition methods, data usability and representativeness, data interpretation, remedial approaches, and compliance with state and federal regulations.

Site Investigation and Remediation

- Responsible for contaminant source delineation and control; vapor intrusion investigations; management of contaminant migration; assessment of the fate and transport of contaminants in groundwater, surface water, sediment, soil and air; evaluation of sites containing dense and light non-aqueous phase liquid (NAPL); evaluation of risk to human and ecological receptors; feasibility studies to determine appropriate remedial technologies for implementation in remedial action plans; design and implementation of remedial alternatives; and oversight of operation, maintenance, and monitoring plans. Has experience in environmental settings throughout the US

including complex overburden and bedrock conditions. Has employed investigation technologies including test pits, soil borings, bedrock corings, monitoring wells, Geoprobes, multiple shallow and deep geophysical techniques (including seismic refraction, magnetics and ground penetrating radar), multiple environmental media sampling techniques, analytical and numerical modeling, aquifer testing (slug tests and pump tests under transient and steady state conditions, fully penetrating and partially penetrating conditions, and saturated and unsaturated conditions), multiple screening techniques, and soil gas testing. Has direct experience investigating and remediating sites contaminated with volatile organic compounds, semi-volatile organic compounds, heavy metals, cyanide, dioxin, wood treatment preservatives (creosote and pentachlorophenol), PCBs, pesticides, herbicides, Stoddard solvent, jet fuel, fuel oils, kerosene, gasoline, asbestos in soil, and radioactive waste. Has expertise in remediating sites using source removal, containment, hydraulic control, free product recovery, soil vapor extraction, pump and treat, bioremediation, and institutional controls.

- Conducted and directed estimations and quantifications of costs for the investigation and remediation of contaminated sites. Has specific expertise in developing alternative remedial design scenarios, corporate due diligence and litigated matters. Experienced in liability valuation for individual sites and portfolios of sites for large corporate clients seeking to divest themselves of environmental liability. Has conducted cost escalation comparisons as part of portfolio analysis, evaluated liabilities associated with various remediation contract vehicles, and negotiated risk-sharing remediation contracts on behalf of clients (such as guaranteed fixed price). Experienced in liability estimating using stochastic modeling, fair value estimates and multi-scenario forecasting.
- Assisted counsel and insurers in reviewing the technical approach of other consultants in investigating and remediating contaminated sites, the reasonableness and appropriateness of costs associated with emergency response activities, site investigation and remediation, the cause of underground storage tank and above ground storage tank failures, and regulatory compliance.
- Provided liability assessment, cost containment, and settlement support on multiple insurance portfolios for Superfund and state-lead sites throughout the U.S. Rendered opinions regarding the appropriateness and reasonableness of past and future defense and indemnity costs. Has assisted insurance run-off administrators in claims management and settlement.
- Provided litigation support and served as technical expert for the insurer with the greatest allocation of a multi-million dollar environmental claim to oversee site investigation and remediation at two large-scale bulk petroleum distribution facilities. Served as technical coordinator for four national environmental consulting firms, four national insurance companies, and three potential responsible parties. Also coordinated with four law firms, two California regulatory agencies, EPA, and a Special Master (retired judge) assigned to facilitate cost allocation. Provided guidance to achieve greater efficiency in the project, and established budgets and remedial goals (which had not been identified during prior cost allocation activities).
- Provided third party review of other professional's scopes of work, data acquisition methods, data usability and representativeness, data interpretation, remedial approaches, and compliance with state and federal regulations.
- Developed and used commercially available analytical and numerical models to simulate groundwater flow and contaminant transport in one, two, and three dimensions. Developed an analytical model using kinematic wave theory to predict subsurface stormflow and stream channel flow in upland watersheds. Assisted in the development of a numerical model to estimate time to breakthrough for contaminants migrating through double liner systems at hazardous waste disposal facilities as required under HSWA. Developed a model to estimate mass loading of PCBs and heavy metals via groundwater into estuarine sediment. Experienced in contaminant isopleth mapping using kriging and other algorithms. Has predicted arrival times of contaminant plumes at downgradient receptors using analytical and numerical (MODFLOW) models. Experienced in model initialization, calibration, verification, sensitivity analysis, and data visualization.

- Managed activities associated with risk assessment to human and ecological receptors at several hundred sites. Experienced with MCP Short-form risk assessments, method 1, method 2 and method 3 risk assessments (and combinations of these methods), and stage 1 and stage 2 environmental risk characterizations. Experienced directing multiple imminent hazard evaluations, substantial hazard evaluations, and safety hazard evaluations. Has developed and implemented institutional controls, including activity and use limitations at multiple sites, as well as site-specific risk standards.
- Evaluated various remedial alternatives for contaminated sites. Has directed the implementation of remedial actions at more than 700 sites. Guest lecturer several times per year at Harvard Graduate School on the appropriate development and implementation of remedial action plans for contaminated sites.
- Directed and managed more than 600 environmental insurance claims for insurance carriers at industrial, commercial, and residential locations. Considerable expertise and experience in helping insurers with cost containment, management of reserves, and minimizing impacts to loss ratios. Extensive experience developing project strategies and evaluating data to assist insurers in coverage decisions. Has extensive experience coordinating activities among insureds, claimants, insurers and reimbursement funds.
- As part of a very large litigation, developed an application to review large quantities of technical data and reports and to mine the documents for specific information relative to contaminated sites and the occurrence of chemicals in groundwater to support counsel's legal strategy. The metadata mined included both qualitative and quantitative data, geo-referenced to GIS maps. Relevant metadata were used to populate a Master Database with specific information counsel was interested in capturing. The Master database could then be used to conduct sophisticated queries that allow the user to select sites (or reports) from the entire population of documents based on custom-defined details so that further detailed analysis could be conducted. The project facilitated the rapid review of 1.9 million pages from 123,750 documents for 1,472 sites and generated thousands of records of data in less than 12 weeks.
- Provided LSP opinions on hundreds of sites for industrial and commercial concerns and assisted clients with Release Notification. Opinions have included Immediate Response Actions (IRAs), Release Abatement Measures (RAMs), Utility-Related Release Abatement Measures (URAMs), Limited Removal Actions (LRAs), Bills of Lading, Downgradient Property Status (DPS), Phase I, Phase II, Phase III, Phase IV, Phase V, Remedy Operation Status (ROS), Remedial Monitoring Reports, Activity and Use Limitations (AULs), and Class A, B, and C Response Action Outcomes (RAOs). Experience with Critical Exposure Pathways, Conditions of Substantial Release Migration, Method 1, 2, and 3 human and environmental risk characterizations, Tier I and Tier II site management, Numerical Ranking of sites, post-RAO monitoring, and extensive public participation and presentation activities on behalf of clients. Has been retained multiple times to provide technical oversight of other LSPs for clients, counsel, and insurers.
- Directed the investigation and cleanup of more than 500 contaminated sites in accordance with New Hampshire regulations and policy. experienced with initial response actions (IRAs), initial site characterizations (ISCs), site investigations (Level I and Level II), supplemental site investigations, groundwater quality management permits, groundwater quality assessments, remedial action plans (RAPs), remedy implementations (RIs), and risk assessments. Has achieved Certificates of Completion and Certificates of No Further Action at numerous sites.
- Developed, directed and implemented site investigations and remedial action plans for more than 200 facilities with leaking underground storage tanks (USTs) and above ground storage tanks (ASTs) throughout the northeastern US. Experienced with regulations for Massachusetts, New Hampshire, Connecticut, Maine and Vermont. Has managed sites where contaminants released from the tanks have included petroleum products and chlorinated solvents.

- Directed hydrogeologic investigations and remedial activities at multiple state-lead and Superfund sites where uncontrolled dumping of hazardous wastes was conducted, resulting in nearly 1,000 buried drums at one site, 800 drums at another site, and "midnight" dumping of tens of thousands of gallons of liquid wastes.
- Provided technical direction for the investigation and remediation of multiple sites where PCBs have been identified in building caulk, paint, and the environment proximal to the buildings as well as in indoor air. Experience negotiating with state and federal regulators and coordinating project investigation and remediation activities pursuant to the Toxic Substances Control Act (TSCA), the Occupational Safety and Health Administration's (OSHA) regulations, and the implementing state environmental regulations for contaminated sites

Environmental Litigation

- Provided expert opinions concerning the date and timing (sudden and accidental or longer term) of contaminant releases using groundwater flow models, chemical fate and transport assessment, contaminant plume morphology, contaminant transport velocity and plume lifecycle analysis. Has rendered opinions concerning the volume of releases required to result in observed contamination using mass balance calculations, groundwater flow and contaminant transport calculations, and chemical fate and transport analyses. Rendered expert opinions concerning whether third parties have been impacted by contaminant releases to soil, groundwater, surface water and sediment. Prepared opinions of remedial cost estimates, assisted in pre-trial negotiations, prepared technical exhibits for trial, and assisted counsel in real-time evaluation and development of lines of questioning during deposition and trial.
- Rendered expert opinions on the fate and transport of contaminants in soil, groundwater, surface water and air, including the potential for contaminants to impact human and ecological receptors (including public water supply wells, wetlands, and adjacent properties); and the exposure routes of contaminants to potential receptors. Provided expert opinions on the costs required to remediate contaminated sites. Experience includes contamination in soil, groundwater, surface water, sediment, or air resulting from dense non-aqueous phase liquids (DNAPL), light non-aqueous phase liquids (LNAPL), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), petroleum hydrocarbons, heavy metals, Stoddard solvent, and jet fuel.
- As part of bankruptcy proceedings, provided expert opinions on the timing of a release and source of contamination on a property to determine if the bankrupt lessee was returning a property to the lessor in the condition in which it was leased. Rendered opinions on the cost required to remediate the property to state required standards.
- Provided opinions whether blasting of bedrock during development of a subdivision could have resulted in a loss of well yield in residential wells in a nearby neighborhood.
- Provided technical review for defense counsel of the reasonableness and appropriateness of remedial costs incurred and projected for several remedial scenarios to bring sites to regulatory closure when multiple potential responsible parties (PRPs) have been involved. Simulated equilibrium-phase partitioning between air-water-soil-sediment phases to assess the potential mass of contaminants that could be released by a PRP.
- Provided litigation support on the source of chlorinated solvent contamination (perchloroethylene (or tetrachloroethene) (PCE), trichloroethylene (TCE), cis-1,2-dichloroethene (DCE), and vinyl chloride) alleged to have resulted from dry cleaning operations. Issues in dispute included substantial endangerment, vapor intrusion, extent of contamination, reasonableness and appropriateness of the remedy proposed by the opposing expert, and the standard of care related to environmental consulting practices.
- Provided litigation support in a state toxic tort alleging personal injuries and medical monitoring damages for alleged groundwater contamination with trichloroethylene (TCE) and ammonium perchlorate at a confidential rocket motor manufacturing company.

- Provided litigation support in a toxic tort alleging personal injuries resulting from groundwater contamination due to trichloroethylene (TCE). Assisted in developing trial exhibits to support opinions on the development of the state of knowledge of landfills as a contaminant source and groundwater contamination; and the timeliness of remediation at the site.
- Provided litigation support in a motion for summary judgment related to the state of knowledge of the design and construction of surface impoundments and the standard of care for: 1) decommissioning hazardous waste and solid waste management facilities, and 2) assessing contaminant releases at hazardous waste and solid waste management facilities.

Prior to joining ENVIRON, Eric was a Hydrogeologist and Specialist in hydrogeologic investigations throughout the US at industrial facilities, hazardous waste and solid waste landfills, and uncontrolled hazardous waste sites where he:

- Conducted under several state-lead and federal programs such as the Massachusetts Contingency Plan, CERCLA and RCRA.
- Performed source delineation and control; management of contaminant migration; assessment of the fate and transport of contaminants in groundwater, surface water, sediment, soil and air; evaluation of sites containing dense and light non-aqueous phase liquid (NAPL); evaluation of risk to human and ecological receptors; feasibility studies to determine appropriate remedial technologies for implementation in remedial action plans; design and implementation of remedial alternatives; and oversight of operation, maintenance and monitoring plans.
- Investigated and remediated sites contaminated with volatile organic compounds, semi-volatile organic compounds, petroleum hydrocarbons, heavy metals, cyanide, dioxin, PCBs, pesticides, herbicides, Stoddard solvent, jet fuel, fuel oils, kerosene, asbestos in soil and radioactive waste. His expertise in remediating sites has been successfully employed using source removal, containment, hydraulic control, free product recovery, soil vapor extraction, pump and treat, bioremediation, *in situ* chemical oxidation and institutional controls.
- Served as lead technical expert for counsel in several litigated matters and has provided expert witness testimony in deposition and trial. He has expertise in third party review of other consultant's work products, discovery strategy, preparation of technical exhibits, evaluation of opposition testimony, real-time development of lines of questioning, acquisition of technical evidence, and conveying complex technical information in understandable terms to judges and juries.

CREDENTIALS

Registrations and Certifications

Professional Hydrogeologist, no. 91-HG-937

Massachusetts Licensed Site Professional, no. 7262

New Hampshire Professional Geologist, no. 361

OSHA 29 CFR 1910.120 40-Hour Safety Training

OSHA 29 CFR 1910.120 8-Hour Refresher Training

OSHA 29 CFR 1910-120 Supervisor Training

Professional Affiliations and Activities

Member, American Institute of Hydrology

Appointed Member, Board of Registration of American Institute of Hydrology

Eric S. Wood, PHg, PG, LSP

Licensed Site Professional Association

PUBLICATIONS & PRESENTATIONS

Wood, Eric S. An Overview of Environmental and Regulatory Factors in Developing Brownfields Sites in Massachusetts", presented to the Harvard Graduate School, 2008, 2007, 2006, 2005, 2004, 2003, 2002, 2001, 2000, 1999, 1998.

Wood, Eric S. Soil and Groundwater Investigations at Contaminated Sites, presented to the Harvard Graduate School, 2008, 2007, 2006, 2005, 2004, 2003, 2002, 2001, 2000, 1999, 1998.

Wood, Eric S. Physical, Chemical, Thermal, and Biological Remediation Technologies for Solid, Aqueous, Leachate, and Vapor Waste Streams Using On-Site and Off-Site In-Situ, Ex-Situ, and Containment Methods," presented to the Harvard Graduate School, 2002, 2001, 2000, 1999, 1998.

Wood, Eric S. Managing Environmental Contamination at Construction Sites", presented to the National Association of Women in Construction, MIT, Cambridge, MA, 2002.

Wood, Eric S. Preventing and Managing Environmental Insurance Claims", presented to the Vermont Insurance Association, 1992.

Wood, Eric S. Complying with the Massachusetts Contingency Plan and the Role of the LSP", presented to the New England Gas Association, 1999.

Wood, Eric S. and Johnson, Russell A, and Wozmak, Richard J. Soiliner Model – Documentation and User's Guide (Version 1)", prepared for the U.S. Environmental Protection Agency, Office of Solid Waste, Washington, D.C., Contract No. 68-01-6871, Assignment No. 48. April 1986.

Jeffrey Raumin, PE | Senior Manager

Irvine, California
+1 949 798 3653 | jraumin@environcorp.com

Jeff Raumin has more than 20 years of experience in environmental science and engineering, with special emphasis in site investigation and remediation. He has been involved in multiple complex site investigation and remediation programs at sites impacted by petroleum hydrocarbons, chlorinated solvents, metals and other chemicals, where he successfully negotiated site closure. Remediation technologies utilized include soil vapor extraction, UV oxidation, in situ chemical oxidation, bioremediation, and excavation. Jeff has conducted numerous environmental assessments and due diligence reviews across an array of industries.

EDUCATION

2003 MBA, University of Southern California

2000 MS, Engineering, California State University, Long Beach

1990 BS, Chemical Engineering, University of California, Santa Barbara

EXPERIENCE

- Designed, implemented and obtained closure for a remediation system at an entertainment studio in Burbank, California impacted with chlorinated solvents. The remediation design consisted of a multiple nested vapor extraction wells connected to a vapor extraction unit and vapor phase granular activated carbon. After six months of operation the soil vapor concentrations were at regulatory acceptable levels. The regulatory agency issued a "No Further Action" letter and the site was closed.
- Designed, implemented and obtained closure for a remediation system at a mining facility in Trona, California impacted with petroleum hydrocarbons. The remediation design consisted of a bioslurping extraction wells that removed free product and groundwater and elevated the subsurface oxygen environment to promote biodegradation of the petroleum hydrocarbons in the vadose zone. The system was operated for approximately two years and reported significant reduction is in situ petroleum hydrocarbon concentrations and free product. The regulatory agency issued a "No Further Action" letter and the site was closed
- Conducted a process evaluation study for a mining facility in Trona, California to address petroleum hydrocarbon compounds in there process waste stream. Tasks included developing and implementing a process wide sampling plan to generate a system mass balance, designing and implementing a pilot test to evaluate membrane, carbon ,and walnut shell filtering technologies as tertiary treatment options, and preparation of various regulatory required reports including a feasibility study evaluating process options for eliminating petroleum hydrocarbon discharges.
- Engineer that supported a large multi-phase extraction system to remediate aviation fuel at an air base in El Centro, California. Developed schematics and designed pneumatic fracturing points to enhance air flow through areas of lower permeability.
- Conducted a chemical injection project at a mining facility in Fresno, California. A mixture of peroxides and chelating iron was injected into the vadose and saturated zones to treat petroleum hydrocarbons. Petroleum hydrocarbon concentrations were significantly reduced across the site with the most impacted area reporting over an 80% reduction in concentrations.
- Designed and implemented a pilot study for bioremediation of diesel fuel impacted soil in ground water at a naval facility in Salton Sea, California. The study evaluated if the high saline content in the ground water would limit biodegradation at the site. Approximately 40 air sparge points and horizontal vapor extraction wells were

installed to increase the subsurface oxygen levels and promote biodegradation. The study found significant bioactivity and decreases in petroleum hydrocarbon concentrations over the six months of pilot operations.

- Conducted a hazardous waste and materials evaluation for a hospital in Southern California. Conducted a site audit and prepared a comprehensive report identifying new strategies and methods for managing there facility's hazardous waste and materials.
- Conducted soil investigations at over 20 former UST locations at a US Marine base in Southern California. Documented the historical information of each tank, prepared work plans and data reports to obtain regulatory closure of these previously undocumented tank locations.
- Conducted numerous Phase I and Phase II investigations in association with due diligence projects. Sites included mining facilities, aerospace facilities, and other commercial and industrial facilities. Duties included review of historical and regulatory documents and collection of soil gas, soil, and ground water data to assess the environmental condition of the various properties.

CREDENTIALS

Registrations and Certifications

Registered Chemical Engineer: California No. CH5942

Professional Affiliations and Activities

Member, American Institute of Chemical Engineers

Erik S. Pearson, CPP, CEM, EIT | Senior Manager

Irvine, California
+1 949 798 3614 | epearson@environcorp.com

Erik Pearson has over 16 years of experience in environmental compliance, site investigation and site remediation. He provides technical and management expertise for soil and groundwater remediation projects, regulatory compliance projects, air quality permitting compliance and human health risk assessments. Erik has designed, implemented and managed various phases of site characterizations, feasibility studies, cost estimations, remediation engineering design and implementation and health risk assessments at numerous contaminated sites under various federal, state and local environmental regulatory agencies. He has performed remediation engineering for sites contaminated with petroleum hydrocarbons, chlorinated hydrocarbons, 1,4-dioxane, light non-aqueous phase liquid (LNAPL), dense non-aqueous phase liquids (DNAPL), NDMA, perchlorate and nitrate, and has tailored a wide variety of ex situ and in situ techniques applicable to each specific project.

EDUCATION

1995 BS, Chemical Engineering, Oregon State University

EXPERIENCE

- Co-designed a hydraulic containment and treatment system for chlorinated solvents detected in water bearing fractured rock at a former test facility.
- Evaluated remediation progress reports and/or Phase I and Phase II assessment data for various clients and provided an assessment of viable remedial technologies with the associated costs to ascertain the most cost-effective approach toward closure. Facilities include, aerospace manufacturing, dry cleaners, industrial/commercial property owners, and former oil recyclers.
- Managed a Phase II assessment for a commercial/industrial complex. Evaluated data assessment, identified remedial alternatives, developed remedial costs, worked with the local oversight agency to simplify the path to closure.
- Prepared numerous air quality permit applications that involved estimating toxic and criteria pollutant emissions
- Managed and performed a Title V permit audit for a large aerospace company.
- Conducted a facility compliance audit and environmental permitting for an FDA-approved hair-care product manufacturing facility. Managed ongoing compliance for the facility.

Prior to joining ENVIRON, Erik held the following positions:

- Project Engineer/Senior Project Engineer/Project Manager, E2 Environmental, Inc. Irvine, CA
  - Project manager and senior engineer performing design, permitting and construction management for a multi-million dollar ground water treatment system renovation project in Henderson, Nevada. The treatment system consists of an air stripper, liquid-phase carbon treatment, and proportional flow distribution system, all controlled under a supervisory control and data acquisition system (SCADA). The system extracts ground water from approximately 13 extraction wells and proportionally re-injects treated water to three distribution trenches down gradient of the extraction wells. Prepared all the detailed design drawings in AutoCAD for the project.
  - Designed and permitted a wastewater clarifier system for local fire department training facility for ash laden water and performed construction management.

- Designed ground water extraction and/or remediation systems, at two different refineries involving dual-phase extraction and treatment. One design included free product removal, soil vapor extraction and catalytic oxidation treatment. The other was a design-build pump and treat project with construction management.
- Performed engineering, design, permitting and construction management of multiple remediation systems for ConocoPhillips and ARCO. Remediation experience includes soil vapor extraction, ground water extraction, dual phase extraction, hydraulic containment, (LNAPL) extraction, air-sparging, ozone sparging, and in-situ chemical oxidation and soil excavation. Treatment systems included thermal oxidation, air stripping, LNAPL phase separation, and granular activated carbon.
- Designed treatment system for BTEX and MTBE constituents—dual-phase extraction/treatment, which utilizes catalytic oxidation system with heat exchangers to raise the temperature of water prior to extraction and soil vapor removal for final treatment of water.
- Treatment design for major chemical manufacturer—chlorinated solvent extraction treatment system—through advanced oxidation, stripping, and carbon technologies.
- Assisted in final design on treatment system to remove chlorinated compounds within the Orange County Water District. This 600-gpm system will use advanced oxidation, air-stripping, and carbon technologies.
- Perform air quality emissions reporting, annual storm water reporting and regulatory compliance audits for various clients.
- Prepare and audit storm water pollution prevention plans and spill prevention control and countermeasure plans.
- Prepared permit applications, obtained wastewater discharge permits, managed compliance for remediation and furniture manufacturing sites, and for various other sites.
- Project manager and engineer for all air quality permitting, planning, and compliance projects. Typically includes identification and categorization of emissions sources, permitting, and health risk assessments, sometimes includes air dispersion modeling.
- Performed numerous health risk assessments for sites with contaminated soil, ground water, and air pollution. Sites include landfill, gasoline service stations, chemical manufacturing, and various vapor extraction/treatment sites.
- Participated in the health risk assessment update for the Monsanto facility in Carson, California.
- Proficient with the Johnson & Ettinger model and other indoor air intrusion analysis models.

- Project Engineer, Advanced Environmental Controls Consulting and Engineering Services, Inc., Newport Beach, California
  - Prepared final documents for environmental permit applications, environmental site assessments, compliance audits and plans.
  - Performed computer based air-dispersion modeling and final reports for air quality regulation compliance for served industries.
  - Prepared Title V documents and computer based presentations with MS PowerPoint for clients.
  - Prepared detailed tables in MS Excel, block flow diagrams and AutoCAD drawings for final documents.
  - Interfaced with clients on a regular basis and assisted with business development.

- Continuous emission monitoring system integration and regulatory compliance investigations for a major secondary lead smelting plant, involving site walks, environmental audits, source testing, and regulatory permit applications.
- Source testing at various manufacturing facilities for air quality and OSHA regulatory compliance; industries include secondary lead smelting, secondary aluminum smelting, almond processing, aerospace and electronics.
- Performed Phase I Environmental Site Assessments involving interfacing with the clients, performing site walks, interviews, reviewing aerial photographs, well logs, topographical maps, environmental database compilations and preparation of final reports.
- Managed soil borings and sampling at various tenant properties for Phase II Environmental Site Assessments for served industrial sites.
- Managed the inspection and removal of hazardous wastes from tenant properties.
- Directed a multidisciplinary field and laboratory investigation of the physical, chemical, and biological processes affecting the fate and transport of chlorinated solvents in ground water, as part of the USGS Toxic Waste-Ground Water Contamination Program.
- Directed a $1.3-million ground water contamination assessment at two RCRA-regulated industrial waste treatment facilities at a US Army arsenal where ground water contamination by chlorinated solvents had affected water-supply wells.
- Conducted a regional investigation of ground water contamination in the Potomac-Raritan-Magothy aquifer system over an area of approximately 1,000 sq. mi. in southwestern New Jersey, with emphasis on trace metals and volatile organic compounds
- Conducted a regional investigation of ground water contamination in the Potomac-Raritan-Magothy aquifer system over an area of approximately 1,000 sq. mi. in southwestern New Jersey, with emphasis on trace metals and volatile organic compounds.

CREDENTIALS

Registrations and Certifications

Certified Permitting Professional # B6037

Certified Environmental Manager: Nevada #EM-2086

Professional Affiliations and Activities

AIChE President – June 2002 to December 2005

AIChE Junior Member – January 2000 to May 2002

Adam M. Duskocy, PG, LEP | Senior Manager

Hartford, Connecticut
+ 1 860 241 0802 | mduskocy@environcorp.com

Adam Duskocy has more than 10 years of experience leading projects related to site assessment and remediation activities at petroleum, industrial and brownfield sites in New England, as well as regulation enforcement and permitting pertaining to on-site wastewater treatment and the Ministry of Natural Resources regulations in Ontario, Canada. Adam has been directly responsible for environmental investigations, remediation and permitting conducted in conformance with numerous regulatory programs and voluntary situations in the state of Connecticut, as well as within federal programs regulated by USEPA, including the Toxic Substance Control Act. He has conducted numerous surficial and bedrock investigations, underground storage tank assessments and in situ remediation feasibility testing and implementation. In addition to traditional site assessment tools, Adam has completed several geophysical assessments pertaining to subsurface structure location, downhole fracture analysis and aquifer characteristic mapping. Adam is a licensed professional geologist in New Hampshire, a licensed environmental professional in Connecticut and a member of the Geological Society of Connecticut.

EDUCATION

2011 MBA, Business Administration, University of Massachusetts-Amherst

2001 BS, Geology, McMaster University, Hamilton, Ontario, Canada

EXPERIENCE

Site Remediation

- Coordinated field activities for the installation of a bioremediation system at an active petroleum retail site. The project entailed the installation of approximately 92 biosparge wells, trenching to install tubing to each biosparge well, installation of the oxygen delivery system and bacteria injection using Geoprobe•technology.
- Prepared remedial alternative evaluation and remedial action work plans for the remediation of contaminated soils, groundwater and building materials, including volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and various metals, in accordance with municipal, state and federal regulations.
- Prepared remedial action plans and requests for variance for the construction of engineered controls over contaminated soils as an alternative to excavation and off-site disposal.
- Coordinated and conducted numerous tank excavation assessments at active and former petroleum retail sites, including assessment of hydraulic lifts, used-oil underground storage tanks (UST), heating-oil UST, oil/water separators and gasolinfrUST and fuel delivery systems.
- Completed remedial feasibility testing and implementation of various remedial technologies, including soil vapor extraction, air sparge, high-vacuum dual-phase extraction, slug testing, yield testing and pump testing and system installation

Site Investigation

- Coordinated and oversaw the completion of multiple Phase II and III environmental site assessments (ESAs) at numerous active petroleum retail sites in Connecticut, New York and Rhode Island.
- Managed the development of conceptual site models and the investigation of contaminated soil and groundwater to assess the nature and extent of contaminated environmental media.

- Coordinated and supervised significant environmental hazard condition abatement and reporting activities.
- Oversaw and coordinated the execution of extensive Phase II and III ESAs, building demolition activities and remedial action planning and implementation on an assemblage of brownfield parcels in Stamford, Connecticut, integrating cost effective and creative remedial approaches to achieve compliance with DEP and USEPA requirements.

Environmental Compliance and Permit Preparation

- Prepared several variance request reports for the construction of an engineered control over contaminated soils as an alternative to excavation and off-site disposal.
- Performed waste characterization for hazardous and non-hazardous process wastes including initial waste characterization requirements and sampling matrices, as well as procedures to perform and update the waste determinations for the waste streams generated at a large manufacturing facility to ensure proper waste management and/or disposal.
- Prepared property transfer Form III filings and environmental condition assessment forms for several industrial and commercial properties.
- Completed technical report preparation, including site status reports, Phase II and III ESAs, remedial action reports, UST closure assessments and remedial feasibly reporting.
- Prepared CTDEP general permit registrations related to the discharge of groundwater remediation, wastewater and contaminated soil and/or sediment management.
- Prepared CTDEP remediation standard regulation (RSRs) variance requests related to the re-use of polluted soils and the utilization of an engineered control as a viable remedial alternative.
- Enforced and prepared permit preparation pertaining to the Ministry of Natural Resources', in Ontario, Canada, regulations surrounding land use within the Ausable River watershed.

CREDENTIALS

Registrations and Certifications

Licensed Professional Geologist No. 773, New Hampshire

Licensed Environmental Professional No. 534, Environmental Professionals of Connecticut

Professional Affiliations and Activities

Member, Environmental Professional's Organization of Connecticut

Member, Geological Society of Connecticut

PUBLICATIONS & PRESENTATIONS

Duskocy, Adam. 2001. Downhole Geophysical Imaging of Groundwater Pathways in Till Deposits. McMaster University School of Geography and Geology, Hamilton, Ontario, Canada.

Elizabeth A. Miesner | Principal

San Francisco, California
+ 1 415 796 1938 | emiesner@environcorp.com

Liz Miesner has over 22 years of experience working on all aspects of human health risk assessments including evaluating analytical data, calculating/modeling exposure point concentrations, developing human exposure criteria, estimating cancer/noncancer risks from exposure to contaminated media, and characterizing uncertainties associated with risk assessment methodologies. She has managed and conducted risk assessments for numerous CERCLA, RCRA and other hazardous waste sites involving the evaluation of human health risks from exposure to contaminants detected in soil, sediment, air, groundwater and surface water. She has prepared and implemented ambient/indoor air monitoring plans to evaluate potential vapor intrusion into buildings or sources in the buildings and has conducted risk assessments of air toxic emissions in support of projects conducted under California's "Air Toxics Hot Spots" bill (AB2588) and Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) and in support of environmental impact reports (EIR).

EDUCATION

1987 MS, Environmental Health Science (Environmental Health Management/Air Pollution), Harvard School of Public Health

1980 BS, Psychobiology, University of California, Los Angeles

EXPERIENCE

- Prepared and implemented numerous ambient/indoor air monitoring plans to evaluate potential vapor intrusion into a building or sources within a building. Monitoring includes volatile organic compounds (including formaldehyde and methane), semi-volatile organic compounds, and air quality parameters collected in approximately 50 commercial/industrial buildings, 30 homes, and three schools.
- Developed a risk-based remediation strategy for redevelopment of a former refinery located in Hercules, California to residential and park use. Work included development of sampling, risk and remediation strategies, evaluation of site data, and presentations/negotiations with the San Francisco Regional Water Quality Control Board (SFRWQCB).
- For a former electronic and communication equipment facility in Mountain View, California, managed and conducted a human health risk assessment to evaluate potential exposure to future onsite residents after redevelopment of the property. The objective of the risk assessment was to develop risk-based concentrations (RBCs) for volatile chemicals identified in subsurface soil and groundwater at the site. The site-specific RBCs were designed to be protective for future residents who may be exposed to volatile chemicals via inhalation while living at the site. Work also included design and implementation of a soil gas sampling plan and a sampling plan for monitoring of natural attenuation parameters for chlorinated solvents in groundwater. The project included coordination/negotiations with the United States Environmental Protection Agency (USEPA) Region 9.
- For a former aerospace facility in Burbank, California, provided strategic risk assessment services for the client, the developer of the property. Future land uses for the site included retail, office, hotel, and restaurant facilities. Work on the project included evaluation of previous site investigations and risk assessments, strategy development with the developer and their law firm, negotiations/interactions with the current property owner consultants and the city of Burbank consultants, meetings with future site occupants, and evaluation of potential Proposition 65 issues.

- For the Port of Oakland, conducted risk assessment related activities for the redevelopment of the Ninth Avenue Terminal. Conducted human health risk assessment activities, oversaw ecological risk assessment activities, interacted/coordinated with Port Environmental Department, the Port Real Estate Department, the Port's lawyers, other Port environmental consultants, the developer, and the developer's consultants. Responsible for presenting the Port's risk assessment work plans to the San Francisco Regional Water Quality Control Board (SFRWQCB).
- Managed and conducted baseline risk assessments for numerous Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA - Superfund) and other hazardous waste sites involving the evaluation of human health risks from exposure to contaminants detected in soil, sediment, air, groundwater, and surface water. Sites evaluated include waste disposal sites, lead smelters, an optical lens manufacturing facility, a DDT manufacturing facility, and a chemical production and synthetic rubber manufacturing facility.
- Performed preliminary risk assessments to be used in the support of interim action decisions at Superfund sites, developed air, soil and groundwater risk-based concentrations for use in screening sites for further evaluation and focusing the development of remedial alternatives, and determined potential health risks associated with selected site remedial actions.
- Managed and conducted screening human health risk assessments of potentially contaminated sites at the Marine Corps Station El Toro for the Southwest Division Naval Facilities Engineering Command (Navy-SWDIV). The assessments used risk-based concentrations to support cleanup decision-making and focus efforts on sites posing the greatest risks. Conducted a well-specific risk assessment for the evaluation of volatile organic compounds in the regional groundwater plume.
- Managed and conducted a human health risk assessment for the Navy-SWDIV at the Naval Weapons Station Seal Beach. Provided senior technical oversight and review for Navy-SWDIV of human health risk assessments conducted at the Marine Corps Base, Camp Pendleton.
- Managed and conducted a human health risk assessment for the Navy-SWDIV for Operable Unit 5 of the former Naval Air Station (NAS) Alameda. The risk assessment included evaluation of soil, groundwater and soil gas data to assess potential exposures to current onsite Coast Guard personnel and potential future onsite residential redevelopment. The chemicals of concern for this assessment were polyaromatic hydrocarbons in soil and volatile organic chemicals in groundwater.
- Managed and conducted a screening human health risk assessments for sites included in the West/Annexes/Basewide Operable Unit at Travis Air Force Base. The purpose of these assessments was to prioritize sites for further investigation or to eliminate those sites requiring no further action based on initial site field sampling results.
- Managed the preparation of a Resource Conservation and Recovery Act (RCRA) Part B Hazardous Waste Treatment and Storage permit for a manufacturing facility in Richmond, California. Units being permitted included two drum storage facilities, eight above ground tanks, and a hazardous waste incinerator.
- Managed and conducted a human health risk assessment in support of a RCRA Part B Permit and Environmental Impact Report (EIR) for a commercial waste treatment, storage, and disposal facility in East Palo Alto, California.
- Managed and conducted a human health risk assessment in support of an EIR for a landfill expansion in Manteca, California where the key issues were landfill gas emissions and diesel exhaust.
- Managed and conducted a screening health risk assessment in support of an EIR to evaluate potential off-site impacts due to incremental diesel particulate emissions from the Oakland Army Base area redevelopment

program. The project evaluated the dispersion of incremental diesel emissions from trucks, trains and ships and the estimated incremental risks to surrounding populations.

- Managed and conducted a human health risk assessment in support of a RCRA Part B Permit for a recycling facility in Reedley, California which focused on solvent emissions and potential exposures to onsite and offsite populations.
- Managed and conducted a human health risk assessment in support of a RCRA Part B Permit for a commercial waste treatment, storage, and disposal facility in Chandler, Arizona.
- Managed site characterization/remediation activities, and prepared a human health risk assessment in support of a RCRA Part B Permit modification and EIR for a proposed land-use change for a manufacturing facility in San Jose, California. This risk assessment required evaluation of potential impacts from soil and groundwater contamination as well as from current and future facility emissions from on-going operations to the proposed future commercial/residential land development.
- Prepared screening-level multi-pathway health risk assessments under the "Air Toxics Hot Spots" bill (AB2588) for air emissions from the South Bayside System Authority and Union Sanitary District municipal wastewater treatment facilities for submittal to the Bay Area Air Quality Management District.
- Prepared a multi-pathway health risk assessment under the "Air Toxics Hot Spots" bill (AB2588) for air emissions from an electronics manufacturing facility in Fullerton, California for submittal to the South Coast Air Quality Management District.
- Managed and conducted risk assessments for seven manufactured gas plant (MGP) sites in accordance with California's Preliminary Endangerment Assessment (PEA) guidance. Results from the risk assessments supported recommendations for different institutional controls and remedial action alternatives. The risk assessments were used as a basis for negotiations with the state on appropriate remedial actions for each site.
- Prepared a Risk Management and Prevention Plan (RMPP) for a large ammonia refrigeration system for a milk distribution and packaging plant in San Leandro, California. Worked with the client to prepare and conduct a 1-day RMPP training program focusing on ammonia refrigeration facilities for the County of Alameda Department of Environmental Health.
- Assisted the Commonwealth of Australia in the evaluation of human health risks due to contaminated soils and groundwater at the former Cockatoo Island Dockyard and in the preparation of technical responses to critical reports received in relation to the arbitration between the former tenant and the Commonwealth.
- Senior reviewer for a health risk assessment of soil and groundwater contamination at the Towrah Lakes Project located in North Cronulla, Australia. The assessment, which was conducted for Australian Housing and Land, evaluated the potential human health risks to construction workers and users of a proposed lake and wetland.
- Conducted a comprehensive technical review of a human health risk assessment and related documents for a lead/sulfide smelter located in Boolaroo, Australia for the New South Wales Department of Planning (DoP). The risk assessment presented a preliminary assessment of the potential lead risk from smelter air emissions to populations in Boolaroo and the surrounding communities. The review included comparing the assessment techniques with current international trends, providing guidance to the DoP as to the suitability of the methodology used, and providing recommendations as to the acceptability of the risk assessment.

Prior to joining ENVIRON, Liz held the following positions:

- Risk Assessment Specialist, CH2M Hill
  - Managed and conducted numerous health risk assessments for CERCLA and other hazardous waste sites.

  - Technical coordinator for risk assessment in the Bay Area Region.
- Research Assistant, Department of Environmental Science and Physiology, Harvard School of Public Health
  - Supervised field operations for a large air pollution/health study, collected and analyzed air samples, and assisted in designing a field study to determine total human exposure to particulates.
- Graduate Teaching Assistant, Department of Biostatistics, Harvard School of Public Health
  - Prepared lectures, conducted weekly review sessions, and evaluated student performance for a graduate course in introductory biostatistics.
- Intern, Monsanto Company
  - Compiled and statistically analyzed data to evaluate the relationship between quantitative results from toxicity, mutagenicity, and carcinogenicity tests of potentially toxic substances.
- Staff Research Associate, Department of Psychology, University of California, Los Angeles
  - Organized and executed experiments that investigated the sexual differentiation of the nervous system and the development of related behaviors.

CREDENTIALS

Professional Affiliations and Activities

Association for Environmental Health and Sciences (AEHS)

- Scientific Advisory Board Member for West Coast Conference (2007 to present)

National Society for Risk Analysis (SRA)

Northern California Chapter of the Society for Risk Analysis (NCCSRA)

- Treasurer (1998-99), President-elect (2000), President (2001), Councilor/Past President (2002)

Northern California Chapter of the Society of Toxicology (NorCal SOT)

- Councilor (2002-04), Web Site Coordinator (2002-04)

Genetic and Environmental Toxicology Association (GETA) of Northern California

PUBLICATIONS & PRESENTATIONS

Keinath, M., Caviness, G., and Miesner, E. 2011. Air Toxics Risk Assessment: The Impact of Applying Age Sensitivity Factors. Poster presentation at the 2011 Annual Northern California Chapter of the Society of Environmental Toxicology and Chemistry (NorCal SETAC) Meeting. May 4-5. California State University, Sacramento, California.

Miesner, E. 2011. Invited Panel Member: Green Chemistry in California - Where is it Now? Where is it Going? Los Angeles County Bar Association, 25th Annual Environmental Law Super Symposium: The Greening of California—Achieving Green Goals in a Time of Limited Financial Resources. April 28. Los Angeles, California.

Caviness, G., Miesner, E., Louie, J., and Posson, M. 2011. Impact of Applying Age Sensitivity Factors (ASFs) on Risk Characterization. Poster Presentation at the 21st Annual International Conference on Soil, Water, Energy, and Air. March 14-17. San Diego, California.

Miesner, E. 2011. Chairperson workshop session ""California Goes Green – California's Green Chemistry Initiative" and talk titled "Toxics Information Clearing House – Identification of Hazard Traits, Endpoints and Other Relevant

Data". 21st Annual AEHS Meeting and West Coast Conference on Soil, Water, Energy, and Air. March 14. San Diego, CA.

Miesner E. and Lester J. 2011. Invited Speaker: Health Risk Assessments and Health Impact Assessments. Southern California Association of Governments, Los Angeles, California, January 31.

Miesner, E. 2009. Vapor Intrusion – Influence of Ambient and Indoor Air Sources. Presented at the 19th Annual AEHS Meeting and West Coast Conference on Soils, Sediments, and Water, San Diego, CA.

Miesner, E. 2008. Invited Speaker. Presentation on "Cost Effective Evaluation of Vapour Intrusion: Human Health Risks from Subsurface Chlorinated Solvents" at Air & Waste Management Association (AWMA) Conference – Vapour Intrusion: Understanding Scientific, Technical, and Legal Issues and Solutions. September 8-10. Toronto, ON, Canada.

Miesner, E. and C. Serlin. 2007. Vinyl Chloride in Indoor Air – Vapor Intrusion versus Indoor Sources. Presented at the 17th Annual AEHS Meeting and West Coast Conference on Soils, Sediments, and Water. March 19-22. San Diego, California.

Bowie, T., D. Daugherty, M. Keinath, E. Miesner, C. Stubbs. 2006. Validation of the Johnson and Ettinger Vapor Intrusion Model Applied to Commercial Buildings. Presented at AIHCE 2006, Chicago, IL. May.

Miesner, E. 2006. Moderator for Sessions on Risk Assessment/Human Health and Perchlorate. 16th Annual AEHS Meeting and West Coast Conference on Soils, Sediment and Water. March 13-16. San Diego, California.

Cline, P., C.A. Lawrence, and E. Miesner. 1997. Risk Analysis: Natural Attenuation Alternative for Trichloroethene. Proceedings of the Fourth International In Situ and On-Site Bioremediation Symposium. Volume 3, pp. 213-218. Battelle Press.

Kirkendall, V., D. Caniparoli and E. Miesner. 1992. Risk Assessment Methodology: The California Experience (Air Toxics). Presented at the Pacific Northwest Air and Waste Management Association 1992 Annual Conference and Exhibition, Bellevue, Washington.

Miesner, E., C. St. Hilaire, R. McDonald, R. Scofield, and G. Van Gelder. 1989. An evaluation of conservative assumptions and methodology in residential and occupational inhalation exposure assessments. Presented at the Society for Risk Analysis 1989 Annual Meeting, San Francisco, California.

Miesner, E.A., S.N. Rudnick, F.C. Hu, J.D. Spengler, L. Preller, H. Ozkaynak, and W. Nelson. 1989. Particulate and nicotine sampling in public facilities and offices. Journal of the Air and Waste Management Association, 39, No. 12, 1577-1582.

Bottjer, S.W., K.A. Halsema, S.A. Brown, and E.A. Miesner. 1989. Axonal connections of a forebrain nucleus involved with vocal learning in zebra finches. Journal of Comparative Neurology, 279 (2):312-26.

McCarthy, J., E. Miesner, and J.D. Spengler. 1988. Environmental Concentrations of ETS. Chapter 6, Environmental Tobacco Smoke: A Compendium of Technical Information. Draft. Indoor Air Division. Office of Atmospheric and Indoor Air Programs. Office of Air and Radiation. United States Environmental Protection Agency.

Miesner, E.A., S.N. Rudnick, L. Preller, F.C. Hu, J.D. Spengler, H. Ozkaynak, and W. Nelson. 1988. Aerosol and ETS sampling in public facilities and offices. Paper #88-76.4. Presented at the 81st Annual Meeting of the Air Pollution Control Association, Dallas, Texas. June.

Bottjer, S.W., E.A. Miesner, and A.P. Arnold. 1986. Changes in neuronal number, density and size account for increases in volume of song-control nuclei during song development in zebra finches. Neuroscience Letters, 67, 263-268.

Miesner, E.A., S.W. Bottjer, and A.P. Arnold. 1984. Afferent input to a forebrain nucleus involved in song learning in zebra finches. Society of Neuroscience Abstracts 10-401.

Bottjer, S.W., E.A. Miesner, and A.P. Arnold. 1984. Forebrain lesions disrupt development but not maintenance of song in passerine birds. Science. 224, 901-903.

Bottjer, S.W., E.A. Miesner, and A.P. Arnold. 1983. Developmental changes in effects of lesions in forebrain song-control nuclei of passerine birds. Society of Neuroscience Abstracts,

Lisa J. Yost, MPH, DABT | Principal Consultant

Chicago, Illinois
+ 1 651 225 1592 | lyost@environcorp.com

Lisa Yost is a board-certified toxicologist with 30 years of experience assisting clients assessing human health risks related to exposure to a variety of chemical substances in environmental media (soil, water and the food chain) in the workplace or within consumer productsShe has conducted or supervised risk assessments under CERCLA, RCRA or state-led regulatory contexts, assisting clients in negotiations with regulatory staff to develop and apply sound technical approaches that realistically characterize potential risk and meet environmental and business objectivesShe has directed project teams comprised of colleagues, consultants, regulatory staff and academic researchers working to develop coordinated strategies addressing human health concernsLisa has extensive experience crafting culturally relevant public health messages directed to diverse technical and non-technical audiencesShe has provided technical support for litigation and detailed toxicological evaluations of numerous chemicals and chemical classes, including polychlorinated dibenzo-p-dioxins and furans (PCDD/Fs), polychlorinated biphenyls (PCBs), pesticides, trichloroethylene (TCE) and other solvents, mercury and arsenicLisa serves as a member of the Minnesota Department of Health Environmental Health Tracking and Biomonitoring Advisory Panel and is an adjunct instructor with the Division of Environmental Health Sciences at the University of Minnesota School of Public Health.

EDUCATION

1980 MPH, Environmental and Industrial Health, University of Michigan

1977 BS, Botany, Miami University

EXPERIENCE

- Conducted or supervised human health risk assessments under CERCLA, RCRA, or state-led regulatory contexts in projects involving potential exposure to a wide range of chemical substances in soil, water, the food chain, and in consumer products
- Conducted detailed weight of evidence evaluations of the carcinogenicity and noncancer endpoints for numerous chemicals and chemical classes including polychlorinated dibenzo-p-dioxins and furans (PCDD/Fs), polychlorinated biphenyls (PCBs), pesticides, trichloroethylene (TCE) and other solvents, mercury, and arsenic and has worked with consortia and trade associations to provide detailed comments regarding the appropriate application of science in regulating these chemicals
- Directed and managed project teams comprised of Exponent colleagues, other consultants, and academic researchers, to develop coordinated strategies addressing human health concernsIn this context, she is effective in managing project deadlines and deliverables and in developing and managing project budgets from very small focused tasks to complex multi-faceted tasks with budgets over a million dollarsShe assists clients in negotiating with regulatory agency representatives and collaborates with project teams to develop and apply sound technical approaches that realistically characterize potential risk and meet clients' environmental and business objectives
- Coordinated with project teams across disciplines and assisted in crafting mutually agreeable public health messages, or in written materials directed to diverse technical and non-technical audiences.

Product Safety

- Served as project manager for an project team that evaluated potential human health exposure pathways related to trace metals in residential wallboard made of either natural (mined) or synthetic gypsum generated via flue-gas desulfurization (FGD) within coal-fired power plants (FGD gypsum)Initial phase included comprehensive analysis of

trace metals in both wallboard sources and determined that maximum metal concentrations were either consistent with background concentrations or much lower than health protective risk based levels for residential or agricultural soil, or workplace airThus exposure pathways for these media were considered incompleteSubsequent analyses of mercury volatilization conducted in a flux-chamber constructed for this purpose at a contract laboratory measured mercury volatilization from synthetic or natural gypsum wallboardFlux results were used to estimate ambient concentrationsResulting concentration estimates were well below health-based screening criteria and also within ambient levelsThis information was used to assess potential liabilities associated with distribution of synthetic gypsum products, and in assessing appropriate feedstock for manufacturing processes Findings were published in two papers in peer reviewed journals.

- For a private client, selling chemical products in Europe, managed and directed two risk assessment reports on human consumer uses and ecological risks under the Registration, Evaluation, Authorization and Restriction of Chemical substances (REACH) systemIn this context, coordinated with the client's international project team to prepare Chemical Safety Reports addressing all physical chemical, use, risk evaluations, and management strategies for the two chemical products
- Managed an assessment of rock products from a quarry found to contain arsenic at concentrations higher than typical background soils or rock productsWorked with a project team to characterize the potential for exposure to arsenic in these products as mined and used including consideration the range of likely bioavailability of the arsenopyrite mineral form of arsenic present, the process steps that could result in exposure and the potential for residential exposures to arsenic from these productsSummarized relevant regulatory standards in all states and provinces where the materials were soldTechnical analysis estimated risks well within acceptable levelsApplied assessment findings to modify the product material safety data sheetThe analyses were used by the client to make decisions about the quarry resource.
- Assessed the potential for use of a consumer product to result in allergic contact dermatitisThe product chemical constituents were reviewed and where indications of irritation or photosensitization were identified, the context and relevance of these findings was further considered Information was used to assess potential liabilities associated with existing products, and in formulating safe new products.
- Managed a rapid turn-around assessment of potential exposures to lead from a toy with a small surface area containing paint with lead concentrations exceeding the Consumer Product Safety Commission (CPSC) levelsEstimated lead exposures resulting from handling and from unintended uses by young children including mouthing, or ingestionThe nature of the paint was also considered to evaluate the degree to which the paint matrix would encapsulate the lead pigmentProduct was removed from distribution within the U.S., but our assessment indicated that product-associated exposures would not exceed regulatory guidelines.
- Served on a project team providing detailed comments to EPA regarding the use of copper chromated arsenical (CCA) pesticides as wood preservativesParticipated in strategy meetings identifying key issues and approaches, drafted comments for internal and client review, and coordinated research into exposure aspects of the assessmentReviewed EPA exposure approach within their deterministic risk assessment and identified critical uncertainties that would benefit most from additional research
- Assessed exposure and health risks of leaching of metals (e.g., nickel, chromium, cobalt, iron, neodymium, tungsten) from alloys used in an implanted medical deviceProjects involved potential device failures as well as assessments in support of FDA submissions for device approvalsReviewed toxicological data on constituents that could leach from the device and developed dose estimates for relevant endpointsDose estimates were then considered relative to biomonitoring dataThese assessments were used by the project team and client in hazard assessment and risk management.

- Managed and conducted a rapid turn-around human health risk assessment regarding the use of formaldehyde to sterilize storage areas in the production of a food productEvaluated all potential exposure pathways related to this useIssues included potential concentrations in the final product and formaldehyde in residual biomass used in feeding cattleThe use as specified was found to be well within acceptable levels as a result of high volatility of formaldehyde.
- Reviewed the technical merits of claimed asbestos exposure in workers who had handled asbestos-containing gaskets during fabrication, installation, removal (scraping and wire brushing), and replacement activitiesIssues included the representativeness of air sampling methods used in exposure studies, the degree to which asbestos could be released from the rubberized matrix, and in exposure analyses for individuals, the relative potential for exposure through contact with this product relative to other workplace exposures to asbestos.

Regulatory Assistance to Private Clients Regarding PCDD/F and Pentachlorophenol (PCP)

- For a private client in Michigan, currently working on a multi-pathway risk assessment where the primary issue is exposure to PCDD/Fs in soil within an urban environment as a result of past aerial deposition and in river sediments, floodplain soils, and the river food chain environment as result of past process releasesCoordinated a group of human health toxicologists to prepare a comprehensive deterministic and probabilistic human health risk assessment work planNegotiated with the Michigan Department of Environmental Quality toxicologists and project managers regarding the most accurate and appropriate means to calculate risk estimatesAs part of the process, considering findings of a comprehensive biomonitoring study conducted by the University of Michigan entitled the UM dioxin exposure study (UMDES), which is a resource in determining site specific area use values as well as actual body burdens in individuals from the areaIn this same setting also providing technical support to outside counsel in litigation regarding property damage for residents whose properties are within the floodplain
- Managed an upland investigation for a former pulp and paper mill in Ketchikan, Alaska, including a focused sampling effort for a fast-track site characterization and risk assessmentSupported negotiations with agency project managers to apply a decision-framework approach to the investigation, including use of source material sampling to focus on limited chemicals and areas of concern; accurate characterization of offsite sources of PCDDs, PCDFs, and arsenic; appropriate comparisons with background concentrations for metals and PCDDs and PCDFs; and use of realistic exposure estimates in risk estimatesAs lead human health toxicologist for an investigation of marine areas at the site, evaluated risks posed by chemicals in sediments that might bioaccumulate into fish or shellfishDespite the use of conservative assumptions required by EPA regarding consumption of fish and shellfish, application of an appropriate use factor resulted in risk estimates within levels considered acceptable to regulatory agencies, and no further evaluation was recommendedDescribed project approach and responded to community concerns at several public meetings and availability sessions.
- Acted as lead toxicologist for two risk assessments of hazardous waste sites in OregonManaged preparation of a baseline risk assessment conducted for a former wood-treatment facility that used PCP, creosote, and arsenical fungicidesUncertainties in the slope factor for PCDDs and PCDFs and evaluation of the comparative risks associated with consumption of fish and crayfish from reference locations were key issues in selecting cleanup levels at the 10^{-4} level for PCDDs in soil and in indicating that cleanup of sediments was not needed based on human healthDeveloped a screening level human health risk assessment for a hazardous waste site located in a unique desert environmentPast releases included process sludges from pesticide (2,4-D) manufacturingPotential contaminants of concern included PCDDs and PCDFs, 2,4-D, 2,4,5-T, TCE, and benzeneThe assessment included evaluation of all potential exposure pathways, and it was concluded that no additional investigation was needed.
- Conducted human health risk evaluations and pathway analyses in support of an evaluation of costs and benefits of bioremediation of PCP-contaminated soil versus excavation and disposal at former wood treating facilities on the West Coast.

- Developed educational materials, including seminars on PCBs, dioxin, and PCP; chronologies of the development of scientific knowledge on PCP, aromatic amines, and the dermal and cardiovascular effects of TCDD; and exhibits used by attorneys and by scientific experts in litigation for private clients including major chemical manufacturers and associations.
- Researched and prepared a 76-page review of the toxicological and epidemiologic literature that investigated an association between exposure to TCDD and adverse effects on the cardiovascu¬lar system as part of litigation involving putative exposure to TCDDAlso reviewed and abstracted more than 30 epidemiologic studies on TCDD and chlorinated phenoxy herbicides.

PCBs and Pesticides

- Managed and completed a comprehensive investigation and human health risk assessment evaluating potential worker exposure to PCBs discovered in concrete joint compound in a flightline area for commercial aircraft in WashingtonDeveloped and applied risk assessment approach for novel exposure pathways, including contact with surfaces as measured by wipe samplesResearched current regulatory guidance within EPA for non-liquid PCBs and evaluated applicable assessments conducted nationwideSite characterization suggested limited migration potential for PCBs from joint compoundThe risk assessment results supported phased removal of PCB-containing material that was both health-protective and practical.
- Conducted human health risk estimates for potential exposure to PCBs present in the natural gas pipeline system considering both workers and residentsAssessment was conducted on behalf of a trade association preparing comments to EPA regarding the Advance Notice of Proposed Rulemaking (ANPRM) that would substantially modify the current EPA Mega Rule for PCBs and reduce allowable PCB concentrations within transmission systemsKey issues considered were the potential for PCBs to be transferred from surfaces and subsequently ingested or absorbed through the skin and appropriate consideration of coplanar PCB toxicity relative to toxicity data for Aroclors®.
- Conducted a human health risk assessment to evaluate potential effects of mercury and PCBs in sediments in an urban lake in New York StateDetailed analysis of uncertainties in EPA's approach to risk assessment of methylmercury and PCBs, as well as selection of a representative fish consumption rate were critical issues in the risk assessmentAlthough the human health risk assessment assumptions required by the State resulted in risks above acceptable levels identified by the regulatory agency, actual risks appeared to be much lower based on application of more relevant mercury toxicity values from the recent literature derived from fish-eating populationsMore recently, worked with EPA Region 2 assisting in a risk assessment related to placement of lake sediments within an onsite sediment containment areaAddressed strong community concerns through development of a risk assessment that evaluated hypothetical accident scenarios and airborne exposure scenariosWorked with EPA staff to prepare the presentation of the assessment for two public meetings
- Provided input into the human health risk aspects of the RI/FS for the Lower Duwamish Waterway Superfund site in Washington by providing detailed comments on documents prepared by another contractorParticipated in meetings with representatives from a group of potentially responsible parties and assisted in negotiations with the regulatory agencies regarding the human health risk assessment approach, conduct, interpretation of findings, and reporting Issues included appropriate consideration of consumption rates for estuarine fish and shellfish, incorporation of data for coplanar PCBs and speciated arsenic data for fish and shellfish estimates, and appropriate methods for evaluation of PCB risks representative of both Aroclor® and coplanar toxicity data without 'double counting' within risk estimates.
- Provided toxicological support in a sensitivity analysis of PCB risk assessmentsThese analyses identified components of the risk assessment method that have the greatest influence on PCB cleanup levelsRisk analyses

were also compared with the 1 mg/kg cleanup level typically applied for PCBs in residential soils to evaluate the relative advantages of application of risk-based or ARAR-based cleanup levels.

- Conducted detailed toxicology evaluations of, 1,3-dichloropropene and 1,2-dichloropropane, for cases involving alleged exposures to fumigants from drift off of fields and from groundwater contaminationSpecifically evaluated the scientific evidence related to whether exposure to these chemicals would cause the alleged health effects.

Solvents and Petroleum Products

- Served as an expert on human health risk assessment of TCE in a large project involving calculation of the emissions, air dispersion, doses, and cancer risks associated with downwind neighborhood exposures to chemicals at a rocket testing facility, including TCE, dioxin, hexavalent chromium, and hydrazinesPrepared an expert report and was deposed regarding the potential TCE risks for downwind residentsThe expert report addressed the human health relevance of each of the toxicological endpoints for high dose TCE exposure in animal studies and also addressed claims made by opposing expertsOne key issue was the determination that application of the opposing expert's proposed cancer slope factor would result in target TCE concentrations well below ambient background concentrations within the state
- Worked with a project team to conduct a hazard assessment of TCE under the EPA Voluntary Children's Chemical Evaluation Program (VCCEP) for an industry allianceThe hazard assessment included a weight of evidence evaluation of all cancer and noncancer endpoints for TCE and although the client elected not to pursue the VCCEP process, the analyses were used to derive toxicity values for TCE based on kidney toxicity and kidney cancer
- Managed a multi-year project that provided technical support for a manufacturing facility in Oregon that detected tetrachloroethylene and TCE in the well supplying water to a large workforceWorked with epidemiological and medical experts from Exponent and from the University of Oregon and University of Washington to identify key health issues for further considerationNegotiated with technical experts from regulatory agencies (Oregon Department of Health, Oregon Department of Environmental Quality [DEQ], and ATSDR), the Portland community (Oregon Health Sciences University), and with consulting firms and law firms to develop an appropriate means to evaluate health effects in children of female employees, both in medical monitoring and in ongoing health investigations initiated by regulatory agenciesAddressed issues and questions related to the medical monitoring or other health concerns at more than 60 meetings with former workers and in one-on-one conversations with workers who felt that their health problems might be related to exposure to chemicals in the workplace drinking waterBriefed project team on new epidemiological literature, and collaborated with the team on issues related to workers' compensation claims and litigation strategy.
- As part of a 5-year review under Superfund, the 2001 draft carcinogenic slope factors for TCE prompted additional investigations regarding indoor airServed on a project team that prepared a weight-of-evidence analysis of the carcinogenicity data for TCEThe team selected a range of inhalation carcinogenic slope factors for application at a number of facilities under consideration because of concerns regarding migration of volatile chemicals including TCE from groundwater to indoor airWorked with the project team in identifying appropriate target concentrations for TCE in indoor air including attending meetings and discussing the approach in internal strategy meetings and in meetings with EPA Region 9 project managers and toxicologists
- Managed a project team of toxicologists and epidemiologists providing detailed comments on the EPA Risk Characterization Document for TCE issued in 2000Comments were submitted seeking a more full and unbiased evaluation of the underlying data on effects of TCE with particular emphasis on the importance of dose and increased reliance on findings from available well-designed epidemiological investigationsCoordinated toxicological input into comments submitted to the National Toxicology Program regarding proposed listing of

TCE as a known human carcinogenThe agency did not ultimately determine that such a reclassification was warranted and decided to maintain the current classification of "reasonably anticipated to be a carcinogen."

- Served as lead toxicologist at two sites in Oregon undergoing investigation and risk assessment under regulatory guidelines identified by the State DEQAt both sites, conducted comprehensive exposure pathway analyses, including the evaluation of the potential for cross-media contamination, and identified limited exposure potentialOne site was a former gas-manufacturing plant with residual petroleum hydrocarbons in soil and groundwater, and the second site was a former flower bulb treating facility with residual pesticides in soilWorked with the Exponent project team in negotiating with DEQ regarding the HHRA and cleanup decisions regarding the former gas-manufacturing facility.
- Led a multipathway human health risk assessment evaluating potential effects to workers related to hypothetical exposure to toluene, methyl ethyl ketone, and acetone in groundwater and soil at a manufacturing facility in southwestern OregonProject team was able to negotiate a reasonable means to estimate concentrations of solvents that would occur in a supply well as opposed to initial use of findings from individual low-draw wellsAssessment was part of the ultimate resolution that site solvents were contained within site boundaries and could be addressed with monitoring and natural attenuation.
- Managed a project to develop risk-based cleanup levels for a former bulk fuel terminal in Seattle, WashingtonWorked with a team of contractors to develop a cost-effective approach that was protective of public health and the environmentSelected approach was based on toxic constituents of petroleum hydrocarbons (i.e., benzene, toluene, ethylbenzene, xylene, and PAHs) rather than total petroleum hydrocarbons and greatly reduced areas identified as requiring cleanupPresented the approach to risk assessment for the site at meetings with the Washington State Department of Ecology.
- Provided technical support to private clients in litigation regarding exposure in occupational and environmental settingsConducted detailed reviews of experts' publications and depositions provided for plaintiffs in litigation regarding TCE and perchloroethylene in groundwater.
- Directed literature searches on 30 chemicals found in Love Canal, and prepared profiles on the health effects of several of these substances, including TCE, 1,1 dichloroethene, and perchloroethylene, in support of litigation.

Air Toxics

- Provided technical oversight, toxicological review, and risk communication support on a risk assessment conducted as part of an environmental impact statement for development of a refinery in Fjardaal, IcelandIn this context, helped to develop the risk assessment approach to apply air model estimates and evaluate all potential human health pathways related to release of PAHs, SO2 and fluoride from the plantPresented the human health assessment approach and findings to the Icelandic regulatory board and addressed questions that arose in that settingWith the project team, crafted risk communication materials for the public.
- Assisted in comprehensive review of the toxicological basis for short-term and long-term air quality criteria for methylene chloride proposed for use in air regulations in IsraelEvaluated air guidelines developed by agencies in the United States, Canada, Europe, Israel and by the World Health OrganizationIn a second phase of this work, reviewed the scientific basis supporting short-term and long-term exposure limits for airborne levels of 12 other chemicals.
- Managed an investigation and risk communication at a wood pulp processing facility in southwest Washington, where an accidental release of hydrogen sulfide, methyl mercaptan, and other mercaptans had resulted in temporary illness in a group of childrenAssisted in developing risk communication materials and in preparation for a meeting with the representative from the Washington State Department of Health.

- Evaluated scientific literature on the carcinogenic, respiratory, and irritant effects of formaldehyde associated with exposure to levels similar to those measured in a plaintiff's home, in litigation involving exposure to formaldehyde in a new mobile homeAlso supervised a literature search and review of immunologic effects of formaldehyde and helped develop testimony for the case.
- Reviewed scientific literature on 26 respiratory toxins, conducted risk assessments on selected carcinogens, and maintained a database on more than 200 chemicals regulated under OSHA's Air Contaminant Rule.
- Collaborated in the development of a unique system to rank more than 200 toxic chemicals carried in commerce by railroad for the risk of acute lethality and serious permanent health effects related to short-term airborne releasesAssisted in preparing comments on proposed changes in DOT regulations affecting the transportation of hazardous materials by rail.
- Reviewed and evaluated risks associated with airborne exposure to toxic chemicals, including lead, PCBs, and PCDDs and PCDFs expected from a municipal garbage incinerator that was planned for Essex County, New Jersey.
- Reviewed the toxicologic and epidemiologic data that investigated cardiopulmonary effects of carbon blackKey issues included control of confounding factors in epidemiologic studies and evidence for a no-apparent-effects threshold in studies in experimental animalsPrepared a report that was submitted to OSHA as part of an effort by the industry to have carbon black reclassified as a nuisance dust.
- Evaluated the epidemiologic and toxicologic literature on the health risks associated with the ingestion of asbestos for a public water utility in southern CaliforniaThis review also investigated the weathering of asbestos fibers in water as a mechanism for the reduction in the carcinogenic potency of ingested versus inhaled asbestos.
- Prepared a chronology of the state-of-the-art industrial hygiene approaches for asbestos for the time period from the turn of the century to 1988Also directed a review of the epidemiologic literature on asbestos and mesothelioma and lung cancer, and prepared an evaluation of potential alternative causes of mesothelioma.
- Prepared a case study on the health issues and the legislative and regulatory history of the use of asbestos insulation in school buildings nationwide as part of a discussion of standard setting for a utilities cooperative in Minnesota.

Metals and Mining

- Managed two tasks providing technical support to a client in preparing a regional management plan/EIS for a former asbestos mine located in the central California Coast range and surrounding recreational area that contains natural deposits of chrysotile asbestosIn one task, collaborated on design of a pilot-scale study to evaluate revegetation potential for severely disturbed and naturally unvegetated portions of the siteIn a second task, evaluated the cost-effectiveness, feasibility, and maintenance requirements of sediment retention structures proposed by EPA in a feasibility study for the former minePrepared a human health risk assessment to evaluate risks associated with inhalation of asbestos from native chrysotile sources occurring within this areaKey issues in the risk assessment were the usability of available ambient asbestos data for risk assessment, quantification of uncertainties in EPA's unit risk factor for inhalation of asbestos, and identification of representative exposure variables for estimation of risks associated with recreational uses of the areaSuccessfully negotiated with representatives from EPA Region 9 to develop a cost-effective approach that was acceptable to the client and EPA.
- Reviewed a risk assessment associated with a former asbestos mine that predicted excess cancer risks from exposure to asbestos in drinking water, soil, and airThe key toxicologic issues included the weight of evidence for carcinogenic effects of asbestos in water and the relevance of increased incidence of benign tumors in experimental animals to predict excess cancer risks in human populations.

- Assisted in risk communication regarding potential health risks related to fugitive dust along an ore haul road and port facility in northwest AlaskaDetection of elevated metals in roadside dust in sensitive tundra habitats raised concerns within the native Inuit community about risks from subsistence foods and adverse effects to the environmentEvaluated potential risks related to high-level consumption of berries, with site-specific concentrations of arsenic, cadmium, lead, and zincProvided risk estimates, discussed approach with consultant for the regulatory agency, and provided information on background exposure to arsenic in foodsPresented approach at public meetings in remote Inuit villages and addressed questions and concerns that arose there.
- Evaluated the potential for arsenic to accumulate into seafood for a client considering redevelopment of property on the Duwamish River in Washington with residual arsenic in soil and groundwaterConsideration of site-specific factors, including likely species present (i.e., lack of shellfish habitat and collection areas) and the methylation status of arsenic in popularly consumed finfish, resulted in more than a 30-fold reduction in estimated concentrations of toxic forms of arsenic likely consumed by anglers relative to those derived on the basis of generic assumptions in the EPA ambient water quality criteria for arsenic.
- Collaborated on an investigation of arsenic intake in the diets of people living in areas of Taiwan with elevated arsenic concentrations in artesian well waterDietary intake of inorganic arsenic was substantially higher than assumed by EPA, suggesting that EPA's toxicity values might overestimate arsenic toxicityIn a separate investigation for a client in litigation, assisted in the direction of a comprehensive study to estimate exposure to inorganic arsenic in the dietUsed findings to establish the relative importance of the dietary sources in comparison with environmental exposures resulting from alleged releases from the client's facility.
- Prepared a human health risk assessment in support of a permit application for reopening the A J Gold Mine near Juneau, AlaskaRisk estimates were calculated for exposure to arsenic through consumption of fish from a creek receiving water from the former mine and for consumption of water from the well fields for the city of JuneauDespite the use of conservative assumptions required by EPA, all estimates for consumption of water affected by arsenic in the former mine outfall were within the cancer risk range often used as a guideline by regulatory agencies such as EPA (i.e., one in a million [10–6] to one in ten thousand [10–4] risk of cancer over background cancer rates) and risk estimates for consumption of fish were much lower than the target risk level of 10–6Furthermore, risk estimates for consumption of arsenic in drinking water affected by the outfall were demonstrated to be lower than background risks associated with exposure to arsenic in Alaska's drinking water.
- Conducted a baseline assessment to evaluate human health risks associated with the planned operation of a gold mine in southeast Alaska that would include discharge of treatment water containing arsenic to the marine environment near an important commercial fishing areaPotential human health risks associated with arsenic bioaccumulation into fish collected from the dilution zone of the outfall were evaluatedCritical aspects of the assessment included recognition of the fact that the area potentially affected by the outfall would be a tiny fraction of the total fishing area (i.e., <0.002 percent)Use of this fractional intake estimate together with estimates of the proportion of arsenic in seafood that might occur in toxic inorganic forms and a range of representative fish consumption rates resulted in excess cancer risk estimates for consumption of inorganic arsenic in seafood well below levels of concern (i.e., risk estimates were less than 10–9)The assessment also provided a discussion of how risks associated with consumption of arsenic would be further reduced when the uncertainties in the toxicity value for arsenic are taken into account.
- Provided technical support for a private client in the RI/FS process at a major Superfund site in Montana that is contaminated with arsenic, cadmium, and leadPrepared detailed technical review comments on risk assessment conducted by contractors for the regulatory agency and assisted in preparing scoping documents suggesting use of site-specific information to conduct more accurate and technically defensible approaches than default approaches suggested in agency guidanceAlso evaluated uncertainties associated with EPA's carcinogenic slope factor for arsenicAssisted in an investigation of the dietary sources of arsenic in Taiwanese study populations that

formed the basis for EPA's toxicity values for arsenicThis study included chemical analyses of organic and inorganic arsenic in yams and rice thought to be dietary staples of the study populationFindings from this study will be used by the client in petitioning EPA for modifications in the oral carcinogenic slope factor for arsenicConducted an evaluation of the potential for arsenic in terrestrial plants to be detoxified by methylation to better characterize the risks associated with consumption of garden vegetables.

- Prepared a detailed evaluation of recent data to assess risks associated with arsenic in soil for a site in Oklahoma contaminated with arsenic, cadmium, lead and zincEvaluated new epidemiologic data and dietary information suggesting that use of the current carcinogenic slope factor may result in overestimates of more than an order of magnitudeAlso considered the implications of data on reduced bioavailability of arsenic in soil compared with water, metabolic data suggesting a threshold for arsenic toxicity, and new data on soil ingestion rates.
- Collaborated on hazard assessment and exposure assessment for a lead-contaminated waste site in CaliforniaPrepared a case study of remediation options taken for similar sites in the state.
- Acted as task manager in a review of the scientific basis for the EPA Office of Drinking Water standard for lead conducted for the American Association of Water WorksWrote sections of the report critiquing the evidence used by EPA in supporting the target blood lead level of 10 -15 mg/dL.

Regulatory Evaluation and Detailed Exposure Assessment

- Collaborated on a preliminary risk assessment that evaluated the human health risks associated with exposure to TCE, arsenic, and PCBs in material used as fill in construction of a roadway in Anchorage, AlaskaRisks to residents and workers were found to be well below levels of concern (i.e., risk estimates were below 10–6), and no further investigations were recommended.
- Managed a program providing technical enforcement support to EPA Region 10 on a wide range of sites regulated under CERCLA or RCRAResponsible for staffing, supervision of budget preparation, quality control on technical deliverables, and oversight of invoices and progress reportsAs a toxicologist and risk assessor on this project, managed multidisciplinary technical reviews of RI/FS project documents, including risk assessments, site inspections, sampling and analysis plans, quality assurance project plans, and work plansRepresented EPA in negotiations regarding the approach to be used in human health risk assessments for several sites and have advised contractors for PRPs on development of work plans for risk assessments, including the identification of contaminants of concern, identification of ARARs, selection of appropriate toxicity values and exposure pathways, evaluation of detection limits to determine whether the limits were low enough to evaluate risks or hazards posed by exposure to contaminants onsite, and the development of site-specific cleanup levels.
- Collaborated on a review to determine how gastrointestinal absorption of contaminants is reduced when the contaminants are adsorbed to soilContaminants evaluated included lead, arsenic, chromium, PCP, and benzo[a]pyreneSignificant reductions were identified for lead and arsenic, and implications for risk assessments of these contaminants were discussed.
- Collaborated on devising a system to rank contaminated sediments in Puget Sound, Washington, based on the toxicologic properties of contaminants and the potential for exposureWrote sections of the report presenting the method for ranking sediments on the basis of their potential to cause adverse effects in humans consuming seafood from contaminated areasThe ranking system will be used by the State of Washington to develop priorities for sediment remediation.
- Reviewed and evaluated studies on the carcinogenicity and mutagenicity of toxic agents to be categorized for regulation by OSHAAudited toxicology and mutagenicity studies submitted to EPA in support of pesticide registration.

- Conducted a review to determine the meaning of significant risk of cancer to workers under OSHA's revised generic cancer policy and as interpreted by health directorates in other countries.
- Coordinated with authors in the publication of a document on research needs in the area of transport and fate of organic pollutants in the environmentEdited and revised the article for accuracyThe document was used to develop a federal EPA budget for research projects on transport and fate.
- Represented the National Women's Health Network before the FDA at a public hearing on toxic shockMaintained national speaker's bureau and spoke at the College of William and Mary and the University of Toronto on occupational health issuesAdvised National Women's Health Network members and public on toxicological questions, most of which focused on reproductive health and maternal and child health.

Prior to joining ENVIRON, Lisa held the following positions:

- Senior Managing Scientist and Managing Scientist, Exponent
- Senior Scientist and Public Health Specialist, PIT Environmental Sciences (now Exponent)
- Senior Scientist, Karch & Associates
- Staff Scientist, Clement and Associates
- Internship Coordinator, National Women's Health Network
- Summer Intern, USEPA, Office of Research and Development

CREDENTIALS

Registrations and Certifications

Diplomate, American Board of Toxicology

Professional Affiliations and Activities

Member, Advisory Counsel to the Minnesota Department of health Environmental Tracking and Biomonitoring

Adjunct Instructor, Division of Environmental Health Sciences, School of Public Health, University of Minnesota

Society of Toxicology

Training Courses

Hazardous Waste Operations and Emergency Response 40-Hour Training Program

Hazardous Waste Operations Management and Supervisor 8-Hour Training Program

PUBLICATIONS & PRESENTATIONS

Kirman C, Budinsky R, Yost L, Baker B, Zabik J, Rowlands C, Long TSimon TDerivation of soil clean-up levels for 2,3,*7*,8-tetrachloro-dibenzo-p-dioxin (TCDD) toxicity equivalence (TEQD/F) in soil through deterministic and probabilistic risk assessment of exposure and toxicity, Hum Ecol Risk Assess 2011:, 17(1):125–158.

Yost LJ, Shock SS, Holm SE, Lowney YW, Noggle JJLack of complete exposure pathways for metals in natural and FGD gypsumHum Ecol Risk Assess 2010; 16(2):317–339.

Menzie CA, Ziccardi LM, Lowney YW, Fairbrother A, Shock SS, Tsuji JS, Hamai D, Proctor D, Henry E, Su SH, Kierski MW, McArdle ME, Yost LJImportance of considering the framework principles in risk assessment for metalsEnviron Sci Technol 2009; 43(22):8478–8482.

Kaetzel RS, Yost LJ, O'Boyle RA, Booth PNAssessment as a decision-making tool for treatment of emissions at a new aluminum smelter in Iceland: 2Human health risk assessmentJ Hum Ecol Risk Assess 2009; 15(3):442–468.

Booth PN, Salatas, JH, Kaetzel RS, Gard NW, Yost LJ, O'Boyle RA, Mackay CERisk assessment as a decision-making tool for treatment of emissions at a new aluminum smelter in Iceland: 1Background and introductionJ Hum Ecol Risk Assess 2009; 15:423–441.

Shock SS, Noggle JJ, Bloom N, Yost LJEvaluation of potential for mercury volatilization from natural and FGD gypsum products using flux-chamber testsEnviron Sci Technol 2009, in 43(7):2282–2287.

Tsuji JS, Yost LJ, Barraj LM, Scrafford CG, Mink PJUse of background inorganic arsenic exposures to provide perspective on risk assessment resultsRegul Toxicol Pharmacol 2007; 48:59–68.

Mandel JH, Kelsh MA, Mink PJ, Alexander DD, Kalmes RM, Weingart M, Yost L, Goodman MOccupational trichloroethylene exposure and non-Hodgkin's lymphoma: A meta-analysis and reviewOccup Environ Med 2006; 63:597–607; originally published online 27 Apr 2006.

Yost LJ, Tao S-H, Egan SK, Barraj LM, Smith KM, Tsuji JS, Lowney YW, Schoof RA, Rachman NJEstimation of dietary intake of inorganic arsenic in U.SchildrenHum Ecol Risk Assess 2004; 10:473-483.

Yost LJ, Shock S, Garry M, Garson YN, Sugino AK, Shields WJHealth risk evaluation of PCBs from joint compound measured on surfaces and in airOrganohal Comp 2003; 63:413-416

Meacher DM, Menzel DB, Dillencourt, M.D., et alEstimation of multimedia inorganic arsenic intake in the U.SpopulationHum Ecol Risk Assess 2002; 8(7):1697-721

Peek DC, Butcher MK, Shields WJ, Yost LJ, Maloy JADiscrimination of aerial deposition sources of polychlorinated dibenzo-p-dioxin and polychlorinated dibenzofuran downwind from a pulp mill near Ketchikan, AlaskaEnviron Sci Technol 2002; 36(8):1671-1675

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

Moore M, Maloy J, Yost LJ, Shields W, Petito Boyce CExposure to PCDDs/Fs: Relative importance of the diet and of soilTAPPI International Environmental Conference, Volume 3, pp1103–1112, TAPPI Press, Atlanta, GA, 1999.

Schoof RA, Yost LJ, Eickhoff J, Crecelius EA, Cragin DW, Meacher DM, Menzel DBA market basket survey of inorganic arsenic in foodFood Chem Toxicol 1999; 37(8):839–846.

Schoof RA, Eickhoff J, Yost LJ, Crecelius EA, Cragin DW, Meacher DM, Menzel DBDietary exposure to inorganic arsenicProceedings, 3rd International Conference on Arsenic Exposure and Health Effects, pp81–88, Elsevier Science Ltd., 1999.

Shields W, Maloy JA, Yost L, Peek DComparison of soil concentrations of dioxins and furans with predictions based on aerial deposition modelingpp455–458In: Organohalogen Compounds, Volume 41Mocarelli P (ed), University of Milano-BicoccaDioxin '99, 19th International Symposium on Halogenated Environmental Organic Pollutants and POPs, Venice, Italy, September 12–17, 1999

Shields WJ., Maloy JA, Winges K, Richmond K, Yost L, Peek DAerial deposition of dioxins and furans from a dissolving sulfite pulp mill in southeast AlaskaTAPPI International Environmental Conference, Volume 3, pp1071–1084,TAPPI Press, Atlanta, GA, 1999.

Yost LJ, Maloy J, Gard N, Moore M, Shields W, Jacobs LDioxins: Threat versus realityA case study at a sulfite pulp millTAPPI International Environmental Conference, Volume 3, pp1085–1102, TAPPI Press, Atlanta, GA, 1999.

Schoof RA, Yost LJ, Crecelius E, Irgolic K, Guo H-R, Greene HLDietary arsenic intake in Taiwanese districts with elevated arsenic in drinking waterHum Ecol Risk Assess 1998; 4(1):117–135.

Yost LJ, Schoof RA, Aucoin RIntake of inorganic arsenic in the North American dietHum Ecol Risk Assess 1998; 4(1).

Slayton TM, Beck BD, Reynolds KA, Chapnick SD, Valberg PA, Yost LJ, Schoof RA, Gauthier TD, Jones LIssues in arsenic cancer risk assessmentEnviron Health Perspect 1996; 104(10):1012–1013

Yost LJ, Schoof RARisk estimates for consumption of seafood collected near the proposed Kensington Mine outfallProceedings, 2nd Annual Conference on Arsenic Exposure and Health Effects, San Diego, CA, 1995.

Bergstrom PD, Greene HL, Schoof RA, Petito Boyce C, Yost LJ, Beck BD, Valberg PAThe use of site-specific studies to assess arsenic health risk at a Superfund siteArsenic: Exposure and healthStLucie Press, Delray Beach, FL, 1995

Karch NJ, Golden RJ, Lowenbach WA, Yost LJ, Weiss ALIdentification and ranking of chemical hazards for the railroad industryJ Am Coll Toxicol 1987; 6(2):171–184.

Published Abstracts

Yost L, Kirman C, Aylward L, Hays S, Pyatt D, Dugard P2011Dose-Response Assessment for Trichloroethylene Renal Carcinogenicity Poster at the 50th Society of Toxicology Annual Meeting, Washington, D.C., March 6–11, 2011.

Budinsky RA, Kirman CR, Yost LJ, Baker BF, Aylward LL, Zabik JM, Rowlands JC, Long TF, and Simon T2009Derivation of Soil Cleanup Levels for 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) Toxicity Equivalence (TEQD/F) in Soil Through Deterministic and Probabilistic Risk Assessment of Exposure and Toxicity Poster at the 19th Annual International Society for Exposure Science (ISES) meeting in Minneapolis, Minnesota, November 1–5, 2009.

Kaetzel RS, Yost LJ, O'Boyle RA, Shirley CH, Booth PNPredictive human health risk assessment for a new aluminum smelter in IcelandPoster at the 46th Society of Toxicology Annual Meeting, Charlotte, NC, March 27, 2007.

Yost LJ, Shock SS, Noggle JJLack of complete exposure pathways for metals in natural and FGD gypsumPoster at Society of Environmental Toxicology and Chemistry Annual Meeting Milwaukee, WI, 2007

Noggle JJ, Shock SS, Bloom N, Yost LJEvaluation of potential for mercury volatilization from gypsum products using flux chamber testsPoster presented at Society of Environmental Toxicology and Chemistry Annual Meeting, Milwaukee, WI, 2007.

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

Yost L, Tsuji JS, Scrafford CG, Barraj LM, Mink PJImplications of changes in arsenic cancer slope factor for risk communicationToxicologist 2006; 90(1), Abstract 2180.

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

Garry MR, Shock SS, Yost LJ, Kulas J, Shields WJAssessment of metals exposure associated with subsistence use of caribou collected near a mining transport road in northwest AlaskaPoster presented at the Society of Toxicology's 43rd Annual Meeting, Baltimore, MD, 2004.

Yost L, Greene JF, Hays SM, Kelsh M, Li A, Sheehan PDerivation of range of interim inhalation cancer slope factors for TCE using physiologically based pharmacokinetic modeling, 2004

Garry MR, Yost LJ, Shock S, Shields WJAssessment of metals exposure associated with subsistence use of caribou collected near a mining transport road in northwest AlaskaPoster presentation at the 43rd Annual Meeting of the Society of Toxicology, Baltimore, MD, March 21-25, 2004.

Yost L, Greene JF, Hays SM, Kelsh M, Li A, Sheehan PDerivation of a range of interim inhalation cancer slope factors for TCE using physiologically based pharmacokinetic modelingPoster presentation at the 43rd Annual Meeting of the Society of Toxicology, Baltimore, MD, March 21-25, 2004.

Yost LJ, Schoof RA, Garry MREstimation of dietary intake of inorganic arsenic in childrenPoster presentation at the 40th Annual Meeting of the Society of Toxicology, Nashville, TN, March 18-21, 2002.

Schoof RA, Yost LJEstimation of inorganic arsenic intake in fish: Market basket vsrecreational catchesPoster presentation at the 40th Annual Meeting of the Society of Toxicology, Nashville, TN, March 18-21, 2002.

Schoof RA, Yost LJA market basket survey of inorganic arsenic in foodp13In: 3rd International Conference on Arsenic Exposure and Health Effects, Book of Abstracts, San Diego, CA, July 12–15, 1998.

Schoof RA, Yost LJ, Beck B, Valberg PRecalculation of the oral arsenic reference dose and cancer slope factor using revised assumptions of inorganic arsenic intake from foodToxicologist 1993; 14(1) Abstract 51:36.

Yost LJ, Sexton JE, Pastorok RAPCDD and PCDF concentrations in Puget Sound crabsToxicologist 1992; 12(1) Abstract 1167:302.

Presentations

Brugger G, Mohsen F, Yost L2010Solvents: Hot Topics in Risk and RemediationExponent Environmental Chemicals Webinar Series No5Tuesday, December 14, 2010Recording available at http://announce.exponent.com/webinar/enviro/solvents/

Kirman CR, Yost L, Budinsky RA, Rowlands JC, Long TF, Simon TDevelopment of a direct contact criterion (DCC) for 2,3,7,8-TCDD TEQ in soil with deterministic and probabilistic methodsPresented at the Dioxin Conference, Birmingham, UK, August 17–22, 2008.

Tsuji JS, Yost L, Barraj LBackground inorganic arsenic exposures in childrenSession on CCA Treated Wood—Regulations, Science, and Risk AssessmentThe Annual International Conference on Soils Sediments and Water, University of Massachusetts, Amherst, MA, October 22, 2003.

Yost L, Tsuji JS, Scrafford CG, Barraj LM, Mink PJImplications of changes in the arsenic cancer slope factor for risk communicationSociety of Toxicology Annual MeetingSan Diego, CA, 2005.

Yost LJConceptual site model: A tool for expedited redevelopmentPresented at the Association for Environmental Health of Soils, San Diego, CAMarch 20, 2002.

Yost LJ, McCrone LSediment risk assessment: Methods and issuesPresentation at Washington Mutual, Ogden, Murphy, Wallace, and AIG Consultants, IncSeattle, WA, December 11, 2001.

Yost LJIssues in risk assessment for mercuryPresented at the 16th International Conference on Contaminated Soils, Sediments, and Water, Amherst, MA, October 18, 2000.

Yost LJ, Shields WJ, Folwarko SDioxins and furans background, toxicity, and issues in sedimentsPresented to Western States Petroleum Association, at an annual technical seminar for WSPA members and state regulators, 1999.

Yost LJ, Schoof RAImplications of the methylation status of arsenic in homegrown vegetables for risk assessmentPresented at the Society for Environmental Geochemistry and Health International Conference on Arsenic Exposure and Health Effects, New Orleans, LA, July 28, 1993

Yost LJ, Evans CGImplications of reduced oral absorption of contaminants from soil for human health risk assessmentPresented at Society for Risk Analysis Annual Meeting, San Diego, CA, December 6–9, 1992.

Petito Boyce C, Yost LJMethods for evaluating risks associated with residual petroleum hydrocarbonsPresented at the Society for Risk Analysis Annual MeetingDecember 9, 1992.

Yost LJ, Schoof RA, Evans CE, Nelson DMHuman health risk assessment for a former wood treatment plantAbstract TA 4F213th Annual Meeting of the Society of Environmental Toxicology and Chemistry, Cincinnati, OH, November 8–12, 1992.

Lynne A. Haroun | Principal Consultant

Emeryville, California
+ 1 510 420 2560 | lharoun@environcorp.com

Lynne Haroun has over 20 years of experience in environmental consulting, with emphasis on human health exposure and risk assessment, risk communication, strategic planning and regulatory support in applications ranging from consumer products to contaminated waste sites. In California, she has particular expertise in Proposition 65, and has conducted evaluations of exposures to chemicals through the use of products encountered by consumers in daily living, as well as by workers in commercial and industrial settings. Services include deriving and critically evaluating NSRLs or MADLs, performing detailed exposure assessments, designing exposure simulation and analytical test protocols and providing support for litigation and negotiations. In the arena of site assessment, Lynne has managed or performed human health risk assessments at over 200 hazardous waste sites and commercial properties in California and other areas of the US to support decisions regarding the need for remediation and development of cleanup goals. These assessments have included evaluation of a wide range of contaminants, media and exposure pathways at sites situated in different geographical locations and environmental settings. She has also provided litigation support for a range of matters, with particular emphasis on exposure or dose reconstruction.

EDUCATION

1975 MPH, Environmental Health Sciences, University of California, Berkeley

1972 BA, Chemistry, University of Rochester

EXPERIENCE

- Developed a methodology for deriving risk-based target concentrations and action levels to ensure that air concentrations of chemicals released during remediation of former manufactured gas plant sites would be below levels associated with adverse health effects to surrounding populations. The approach and reporting requirements were developed to provide appropriate documentation in the event of future litigation.
- For the Department of Energy, worked with the project team, staff of an adjacent high school, and parents to develop a remediation schedule that addressed stakeholder concerns about releases of radionuclides during remedial activities. Other issues included concern over physical hazards associated with increased truck traffic on the narrow road in front of the school and possible accident scenarios.
- Performed multipathway risk assessments at hazardous waste sites using risk-based target concentrations to identify chemicals of concern, exposure pathways, and areas requiring risk management decisions.
- Conducted a risk assessment of property contaminated with metals and pesticides associated with agricultural use. The property was to be redeveloped for residential use.
- Applied tiered risk assessment approaches at multi-site facilities to screen sites from further risk evaluation (no-action sites) and identify sites for more detailed risk evaluation.
- For school districts, conducted risk assessments in support of school construction at former agricultural properties in southern California that were contaminated with pesticides.
- Senior technical reviewer for a preliminary endangerment assessment of an elementary school where dioxins were present in a structural road-base material used beneath playgrounds.
- For the US Department of the Navy, developed risk-based cleanup criteria in support of feasibility studies, and evaluated potential health risks for selected site remedial actions.

- For the US Forest Service, conducted a human health risk assessment of a landfill contaminated with vinyl chloride, tetrachoroethylene, and other chlorinated solvents. The landfill was to be developed as a recreational area that included baseball and soccer fields.
- For the Southwest Division Naval Facilities Engineering Command, developed detailed site-specific exposure scenarios and exposure assumptions to support development of risk-based cleanup goals at currently occupied residential areas.
- Prepared point papers on approaches to risk assessment for the Southwest Division Naval Facilities Engineering Command. Issues evaluated included selection of exposure pathways and a critical review of exposure parameter and toxicity values. The information was used to support development of Naval risk assessment methods and policies.
- Developed and implemented an approach for evaluating potential health risks associated with over 25,000 linear feet of industrial wastewater lines and associated pumps.
- Performed risk assessments under California's Proposition 65, focusing on evaluation of consumer products. Services included designing test protocols, performing exposure assessments, and critically evaluating No Significant Risk Levels (NRSLs).
- Performed an exposure assessment for select consumer articles that may contain trace levels of perfluorooctanoate. Evaluated article use patterns and exposure pathways, including detailed evaluation of residential (infants, children, adolescents, and adults) and occupational exposures.
- Managed the development of toxicity profiles summarizing acute and chronic effects of a variety of chemicals, including industrial chemicals, terrorist threat agents, and biotoxins, in support of Homeland Security programs.
- Managed development of an acute and short-term advisory level for arsenic in drinking water in support of Homeland Security programs.
- Developed and conducted numerous heath risk assessment training workshops for the US Department of Energy.
- Conducted an operational health risk assessment of air emissions from a facility in Oakland, California in support of the facility's Resource Conservation and Recovery Act (RCRA) permitting requirements.
- Conducted a risk assessment of an open golf course where arsenical pesticides had been applied.
- Prepared toxicity profiles on selected chemicals detected at a US Department of Energy facility. The profiles, which were posted on a Web site maintained for the project, were targeted to stakeholders interested in obtaining more information on the health effects of site contaminants as well as project managers and agency representatives.

Prior to joining ENVIRON, Lynne held the following positions:

- Senior Risk Assessor, Tetra Tech EM Inc.
  - Managed the human health risk assessment group. Responsibilities included working with project teams on all risk-related phases of remedial investigations and feasibility studies, interfacing with clients on risk assessment issues, attending meetings and negotiating with regulatory agencies, and presenting risk assessment results to the public and other stakeholders. Risk assessments were managed and prepared under the Comprehensive Environmental Response, Compensation and Liability Act; RCRA; and other regulatory programs.
- Associate Toxicologist, California Environmental Protection Agency
  - Helped establish the Science Advisory Board's Carcinogen Identification Group for implementation of California's Proposition 65.

  - Prepared an extensive review on the physical and chemical properties environmental tobacco smoke and summarized exposure measurements.
  - Revised state criteria for identifying carcinogenic hazards.
- Environmental Health Scientist, Argonne National Laboratory
  - Developed the chemical risk assessment group and served as lead on Department of Energy Projects that included preparing baseline human health risk assessments and developing cleanup criteria.
- Staff Scientist, International Agency for Research on Cancer
  - Served as toxicologist and assistant program manager for the Monographs Program at the International Agency for Research on Cancer (IARC). This internationally recognized program produces a series of monographs evaluating the carcinogenic risks of chemicals to humans.
- Staff Research Associate, University of California, Berkeley
  - In the laboratory of Dr. Bruce Ames, conducted experimental studies to investigate the relationship between chemical carcinogenicity and mutagenicity in short-term tests.

CREDENTIALS

Professional Affiliations and Activities

National Society for Risk Analysis (SRA)

Northern California Chapter of the Society for Risk Analysis (NCCSRA)

Sigma Xi

PUBLICATIONS & PRESENTATIONS

Haroun, L., A.J. Dunn, and D. Ting (1999). Exposure Measurement and Prevalence, in National Cancer Institute, Health Effects of Exposure to Environmental Tobacco Smoke: The Report of the California Environmental Protection Agency. Smoking and Tobacco Control Monograph no. 10. Bethesda, MD. US Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Pub. No. 9904645.

Haroun, L.A., MacDonell, M.M., and Blunt, D.L. (1993). From Preliminary Remediation Goals to Final Remediation Levels: Waltzing Down a Tortuous Path, Proceedings of the Environmental Remediation '93 Conference, Augusta, October.

MacDonell, M.M., Peterson, J., Haroun, L., Blunt, D., and Dunning, D. (1993). Applying ALARA to Cleanup Criteria for a Mixed Waste Site, Proceedings of the Environmental Remediation '93 Conference, Augusta, October.

McCracken, S., Sizemore, M., Meyer, L., MacDonell, M.M., and Haroun, L. (1993). The Evolution of Risk Communication at the Weldon Spring Site, Proceedings of the Environmental Remediation '93 Conference, Augusta, October.

Haroun, L.A., MacDonell, M.M., Peterson, J., and Fingleton, D. (1992). Risk Assessment at a Superfund Site: A Case Study, The Environmental Professional, 14:238-277.

MacDonell, M. and Haroun, L. (1992). Lessons Learned in Talking to the Public about Risks and Cleanup Decisions for a Contaminated Site, poster presented at the Annual Meeting of the Society for Risk Analysis, San Diego, December.

Salmon, A., Haroun, L., Zeise, L., and Jackson, R.J. (1992.) Chloral Hydrate: Criteria for Identification as a Carcinogen on the Basis of Suggestive Data, presented at the Annual Meeting of the Society for Risk Analysis, San Diego, December.

Fingleton, D.J., MacDonell, M.M., Haroun, L.A., Ozkaynak, H., Butler, D.A., and Xue, J., Haroun, L. and MacDonell, M., (1992). Cleanup Criteria for a Superfund Site: Addressing Data Heterogeneity, presented at the Annual Meeting of the Society for Risk Analysis, San Diego, December.

MacDonell, M.M., Haroun, L.A., Peterson, J.M., Blunt, D.A., Fingleton, D.J., and Picel, M.H. (1991). Strategy for Integrated CERCLA/NEPA Risk Assessments, Proceeding of the Environmental Remediation '91 Conference, Pasco, September 8-11.

Waters, M.D., Stack, H.F., Brady, A.L., Lohman, P.H.M., Haroun, L., and Vainio, H. (1988). Use of Computerized Data Listings and Activity Profiles of Genetic and Related Effects in the Review of 195 Compounds, Mutation Research, 205:295-312.

Haroun, L. (1987). The IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Presented at the Joint CMEA/IRPTC/IPCS Seminar on Methodology of Optimal Use of Internationally-Prepared Health Risk Evaluations in Activities Aimed at the Protection of Human Health and the Environment, Moscow.

Wilbourn, J., Haroun, L., Heseltine, E., Kaldor, J., Partensky, C., and Vainio, H. (1986). Response of Experimental Animals to Human Carcinogens: An Analysis Based Upon the IARC Monographs Programme, Carcinogenesis, *7*:1853-1863.

Yamasaki, H., Wilbourn, J.D., and Haroun, L. (1982). Use of Data from Short-Term Tests in the Evaluation of the Carcinogenic Risk of Environmental Chemicals to Humans, in M. Sorsa, and H. Vainio, eds., Mutagens in Our environment, New York, Alan Liss, pp. 169-180.

Haroun, L. and Ames, B.N. (1981). The Salmonella Mutagenicity Test: An Overview, in H.F. Stich, and R.H.C. San, eds., Short-Term Tests for Chemical Carcinogens, New York, Springer-Verlag, pp. 108-119.

Ames, B.N. and Haroun, L. (1980). An Overview of the Salmonella Mutagenicity Test, in M.J. Coon, A.J. Conney, R.W. Estabrook, H.V. Gelboin, J.R. Gillette, and P.J. O'Brien, eds., Microsomes, Drug Oxidations and Chemical Carcinogenesis, Vol. II, New York, Academic Press, pp. 1025-1040.

Benedict, A.F., Baker, M.S., Haroun, L., Choi, E., and Ames, B.N. (1977). Mutagenicity of Cancer Chemotherapeutic Agents in the Salmonella/Microsome Test, Cancer Research, 37:2209-2213.

Hollstein, M. and Haroun, L. (1981). Methods for Identifying Carcinogens and Mutagens, in Postepy Mikrobiologii, Vol. 11, Proceedings of the Workshop on Carcinogenesis, Warsaw.

Douglas Daugherty, PhD, PE, CIH | Managing Principal

San Francisco, California
+1 415 796 1932 | ddaugherty@environcorp.com

Dr. Douglas Daugherty has over 16 years of experience using his cross-disciplinary background in chemical engineering and industrial hygiene to provide solid solutions in areas such as industrial hygiene, air quality, air toxics risk assessments, emergency release, indoor environmental quality and litigation support. He conducts indoor air sampling programs for biological and chemical agents using his background in biochemical engineering and industrial hygiene. He has performed and managed sampling for potential mold and chemical contamination in commercial buildings and in residential dwellings for both commercial and insurance clients as well as for litigation teams. Dr. Daugherty has also prepared remediation protocols for commercial and residential buildings and has supervised successful remediation activities in these structures.

EDUCATION

1994 PhD, Chemical Engineering, Princeton University

1991 MA, Chemical Engineering, Princeton University

1989 BS, Chemical Engineering, Johns Hopkins University (Honors)

EXPERIENCE

- Provided consulting and expert testimony services for the City of Los Angeles, acting by and through the Los Angeles Department of Water and Power, in the consolidated cases under and including Washington Mutual Bank v. City of Los Angeles Department of Water and Power. The case involved alleged underground PCB transport through conduits during a transformer fire in an underground vault in Los Angeles.
- Provided indoor air quality services to evaluate the presence of mold and volatile organic compounds (VOCs) in an office space occupied by a California state agency in Sacramento. Participated in meetings with agency staff to discuss the results of the indoor air samples, which did not indicate any significant presence of mold or VOCs. Several worker compensation claims previously filed by agency workers were denied by the State based on the results of the analysis.
- Managed and performed indoor environmental quality (IEQ) evaluations for potential biological and chemical contamination in commercial and residential buildings. Collected wide range of samples, analyzed laboratory reports, and summarized findings and recommendations.
- Directed and supervised interior and exterior remediation activities at commercial and residential buildings contaminated with mold and/or bacteria. This involved developing remediation protocols in accordance with applicable guidelines and overseeing the efficient implementation of site cleanups.
- Provided litigation support and expert testimony for cases involving the historic reconstruction and/or assessment of potential occupational and public exposures.
- Provided litigation support on mold, water damage, and/or indoor air quality (IAQ) issues to counsel for several different cases involving both housing and commercial structures in the Bay Area, Las Vegas, Nevada, Phoenix, Arizona, and Honolulu, Hawaii.
- Managed an evaluation of the air filtering system used in a large commercial building. Compared the efficacy of different air filters by measuring and analyzing various parameters—including ozone, PM2.5,VOCs,

aldehydes/ketones, diesel exhaust particulate matter, carbon dioxide, wind speed, pressure drop, relative humidity, and temperature.

- Evaluated the potential for vapor intrusion and/or off-gassing of VOCs from interior furnishings in several commercial buildings located near a contaminated groundwater plume in Mountain View, California. Collected air samples, evaluated sampling results, and provided recommendations for reducing potential exposures.
- Managed indoor air quality (IAQ) evaluations for US Green Building Council's Leadership in Energy and Environmental Design (LEED) IAQ credit purposes. Collected wide range of samples required under LEED, analyzed laboratory reports, and summarized findings.
- Assisted in the development of standardized methodologies for mold investigations, remediation protocols, and clearance sampling for a nationwide property management company. Also provided senior-level review of biological and chemical IEQ efforts conducted in their buildings located across the US.
- For a major insurance carrier, performed indoor air, surface, and bulk sampling for potential biological contamination in several residential dwellings in California. Remediation steps were recommended and a list of possible contractors was identified to assist the insurance carrier with remediation efforts, if areas of concern were identified by the investigation.
- Developed a sampling protocol for the first phase of a long term monitoring program that has been successfully implemented at a mining facility in Southern California. The protocol provided details on the meteorological and ambient air sampling for compounds that may be emitted from the Facility. The constituents to be analyzed include metals, diesel, PM10, and radionuclides. This plan incorporated the following elements: program description, selection of chemicals to be sampled, selection of monitoring locations and equipment, sampling procedures and field QA/QC, laboratory analysis and laboratory QA/QC, data quality objectives, and data reporting.
- Provided litigation support and expert testimony regarding airborne emissions from industrial facilities.
- Provided litigation support in a case involving an emergency release of an odorous petroleum mixture. Estimated the potential impact of the release using air dispersion modeling (Gaussian puff model) and fenceline monitoring data.
- Provided support for litigation in a case involving alleged odors from a material recovery facility for commercial and municipal wastes.
- In a land use permitting case, provided expert testimony regarding emergency releases from industrial facilities and their impacts to a nearby proposed development site.
- Provided technical support and testified in a variance request application before the Bay Area Air Quality Management District (BAAQMD) for excavation and fill activities of soils containing volatile organic compounds at a brownfield redevelopment site. Work included estimating emissions and performing a population exposure assessment to determine compliance with BAAQMD regulations.
- Managed dozens of air toxics human health risk assessment evaluations of emissions from a variety of industrial facilities in California for CEQA, regulatory compliance, and California Proposition 65 purposes. All potential air toxics emission sources were identified, source emission rates were calculated, and the off-site impact was estimated using air dispersion modeling and standard human health assessment methodologies for cancer and noncancer effects.
- Retained by the city of Richmond as co-lead on the preparation of an Environmental Impact Report (EIR) required under the California Environmental Quality Act (CEQA) for the Chevron Richmond Refinery's Revised Renewal Project. The EIR must address various potential environmental impacts from the Revised Project including to air

quality, human health risks, greenhouse gases (GHGs), and public safety. Changes in both operations and transportation (truck, rail, and ship) will be evaluated.

- Managed an exposure assessment for use in an air toxics human health risk assessment analysis for all diesel-powered mobile source activities at the Ports of Los Angeles and Long Beach as part of the implementation of the San Pedro Bay Ports Clean Air Action Plan (CAAP). All potential mobile source emission sources were identified using emission rate information provided by the Ports and the off-site impacts were estimated using an EPA-approved Gaussian plume dispersion model (AERMOD) and standard human health assessment methodologies for cancer and noncancer effects.
- Managed air dispersion modeling evaluations of diesel and non-diesel emissions from mobile source activities at eight BNSF rail yards in California as part of the Memorandum of Understanding (MOU) agreement between BNSF and the California Air Resources Board (CARB). All potential mobile and stationary source emission sources were identified, source emission rates were calculated, and the off-site impact was estimated using an EPA-approved Gaussian plume dispersion model (AERMOD).
- For a steel casting facility in the Bay Area, managed the development of an emission inventory, air dispersion analysis, and human health risk assessment for Air Toxics Hot Spots Information and Assessment Act (AB 2588) purposes in accordance with Bay Area Air Quality Management District (BAAQMD) and state guidelines. It was the first AB 2588 risk assessment conducted in the BAAQMD with the EPA-approved AERMOD air dispersion model.
- Conducted a screening health risk assessment to evaluate potential off-site impacts due to incremental diesel particulate emissions from the Oakland Army Base area redevelopment program. ENVIRON worked with the city and Port to determine the source descriptions, including size of source (length, width, and height), location and periodicity of source emissions (time of day). Using the USEPA-approved Industrial Source Complex (ISC) model, ENVIRON evaluated the dispersion of incremental diesel emissions from trucks, locomotives, and ships and the estimated incremental risks to surrounding populations.
- Assisted in the development and preparation of a second Supplemental Environmental Impact Report (SEIR) to the Final EIR for the Airport Development Program (ADP) for Oakland International Airport. Provided technical and strategic consulting assistance to the Port in support of their preparation of an airport human health risk assessment (HHRA) as a part of the second SEIR. Such assistance involved a range of technical analyses, interactions with relevant regulatory agencies (Federal Aviation Administration, U.S. Environmental Protection Agency, California Air Resources Board, and Bay Area Air Quality Management District), and strategic consultation with the Port on a range of matters related to the HHRA.
- Managed an air toxics human health risk assessment analysis for a proposed rail yard operation at the Port of Los Angeles for California Environmental Quality Act (CEQA) purposes. All potential mobile source emission sources were identified, source emission rates were calculated, and the off-site impacts were estimated using an EPA-approved Gaussian plume dispersion model (AERMOD) and standard human health assessment methodologies for cancer and noncancer effects.
- Estimated the human health risks due to expected laboratory emissions from a proposed chemistry building at a California university for CEQA purposes and to assess the applicability of local air toxics regulations. This work included the performance of screening steps to reduce the number of chemicals of potential concern into a manageable number, surveying laboratory personnel to determine how these chemicals were used, development of methodologies to estimate emissions from these laboratory practices, and the estimation of off-site impact using an EPA-approved screening Gaussian plume dispersion model (SCREEN3).
- Managed an air dispersion analysis of baseline and future-year emissions (over a 30-year expansion plan) from a mining facility in Southern California in support of a Human Health and Ecological Risk Assessment (HHERA)

prepared as part of the local permitting requirements under the CEQA. Baseline and future-year concentrations were determined using an EPA-approved Gaussian plume dispersion model (ISCST3) and emissions inventories developed for baseline and future mine operation scenarios.

- Worked with the Bay Planning Coalition, the Bay Area Air Quality Management District, and the 5 public Bay Area ports to develop a Bay Area Seaport emissions inventory for water and shore-based equipment and vehicles at the Ports of San Francisco, Redwood City, Richmond, and Benicia.
- Lead the effort that assisted the Port of San Diego in the development of its Clean Air Program (CAP). The CAP establishes the framework for evaluating local control measures that could potentially be implemented at the port earlier or further than regulatory requirements. The CAP also identifies candidate local control measures that can be further developed into adoptable measures. As part of the CAP development, assistance was provided to the Port in presenting information and soliciting feedback from a stakeholder work group.
- Modeled the dispersion of VOC emissions from a marine tanker loading terminal using the Offshore and Coastal Dispersion Model (OCD) to estimate potential health risks to coastal residents.
- Currently providing assistance to the Port of San Diego in the development of a Climate Mitigation and Adaptation Plan (CMAP) that will address both GHG emission mitigation and climate adaptation strategies for the tidelands under the Port's jurisdiction.
- Provided GHG verification services to general stationary combustion sources, cogeneration plants, waste water treatment plants, and electricity generators and marketers under California rules.
- Assisted a variety of different facilities with advice on or the development of GHG Inventory Management Plans and GHG inventories for compliance under California and Federal GHG mandatory reporting rules.
- Provided assistance to the Port of San Diego in the preparation of a greenhouse gas (GHG) Inventory Management Plan for Port-owned sources and their inventory for reporting under The Climate Registry (TCR).
- Oversaw the preparation of air quality and greenhouse gas technical reports and resource area chapters for an Environmental Impact Report (EIR) evaluating the impact of a state-wide pest eradication program. Utilizing a variety of air modeling techniques, the amount of treatment material (active ingredients and toxics) that exists in the ambient air and that deposits to the ground for each program alternative was determined. This includes drift from all application methods with special attention paid to aerial spraying. The emissions of criteria pollutants (e.g., particulates, carbon monoxide and nitrogen oxides) due to the methods of application and combustion of fuels were calculated to determine if they would result in significant impacts to the environment. The Program's impact on greenhouse gas (GHG) emissions and climate change from various aspects of the program (i.e., mobile sources, portable off-road equipment) was also assessed.
- Currently providing greenhouse gas (GHG) management-related consulting services with respect to California's Assembly Bill 32 (AB32 or the "California Global Warming Solutions Act of 2006") and USEPA's GHG MRR to a variety of industrial firms and to the Port of San Diego.
- Managed the preparation of a white paper on the potential effects of AB32 on a mining facility, which contained information on the relevant reporting standards and protocols. As part of the development of this strategic white paper analysis, ENVIRON developed baseline, current year, and 2020 projected GHG emissions for both direct and indirect sources at the facility using accepted protocols. Sources at the facility included both stationary combustion and mobile sources.
- Managed the development of GHG, criteria pollutant, and/or air toxic emission inventories of mobile and stationary sources for a wide range of industry types and major transportation/goods movement facilities/operations.

- Oversaw preparation of climate change technical reports for Environmental Impact Reports (EIRs) for mixed use developments. This included developing GHG inventories for all aspects of the development (i.e., construction, energy use of buildings, mobile sources, vegetation change, and municipal sources); summarizing the current state of science and regulatory setting; presenting mitigation options; and evaluating the significance of development emissions.
- Assisted the Port of San Diego in a variety of efforts under its Sustainability and Green Port Programs. Support has included the performance of a needs assessment of the Port's existing environmental (water, energy, air (including GHG), waste management, sustainable development, and sustainable business practices) data tracking sets, their relationship to the goals and needs of the Green Port Program, and how these data sets could be integrated into a Data Management System to allow for more efficient tracking of goals under the Green Port Program.
- Managed the development of an Emission Inventory Plan (EIP) and Emission Inventory Report (EIR) for a mining facility in Southern California in support of reporting requirements under local district rules (MDAQMD). The development of the emission inventory required the estimation of criteria pollutant and air toxics emissions from process facilities, fugitive dust sources, and mobile source activities at the mine site. The results of the EIR were summarized as inputs into the State of California's Hotspots Analysis and Reporting Program (HARP) model for submission to MDAQMD.
- Assessed the impact of potential accident scenarios (such as fires, explosions, BLEVEs, and toxic releases) in support of Risk Management Program (RMP)/California Accidental Release Prevention (CalARP) Program consequence analyses, CEQA determinations, and health risk assessments performed for Resource Conservation and Recovery Act (RCRA) part B permitting purposes.
- Managed accidental release impact analyses in support of local permitting requirements in several Bay Area cities. These local requirements focused on the location of sensitive receptors near industrial/commercial locations with potential toxic and/or flammable gas storage. Potential accident scenarios such as fires, explosions, and toxic releases and their potential impacts to defined endpoints were assessed as appropriate.
- Assisted a hydrogen plant facility in California with compliance with federal, state, and local regulations regarding accidental release of hazardous substances. Efforts include preparing the federal Risk Management Plan (RMP) and the California Accidental Release Prevention Program (CalARP) RMP documents in addition to performing offsite consequence analyses for regulated chemicals.
- Prepared a Risk Management Plan under the California Accidental Release and Prevention (CalARP) Program for a plating operation in the San Francisco Bay Area. As part of services provided in support of this effort, ENVIRON conducted a Hazard and Operability (HAZOP) review of the current operations and made recommendations of process/operational changes to enhance the facility's accident prevention goals.
- Estimated the off-site impacts, event probability and failure frequency as part of quantitative risk analysis for a large chemical company. The event probability calculation included estimation of human error probabilities and event frequency analysis. The failure rates were estimated using the available databases on failure rates. The consequence analysis was performed using the ALOHA emergency release model. The acutely hazardous materials considered in the study were chlorine and ammonia in approximately 15 scenarios for five sites.
- Estimated the dispersion of a heavy gas released during accidental spills using several models (HEGADIS, DEGADIS, SLAB). Compared and contrasted advantages and drawbacks of each model.
- Prepared a permit application for a proposed ethanol transload facility in the Bay Area. The work included estimating emissions and public health risk impacts from the proposed operations. The facility obtained its permit from the local air district and is currently operating.

- Prepared a dust control plan for a proposed tailings pond at a mining facility in Southern California. In this plan, ENVIRON estimated the effectiveness of potential dust control measures that are applicable to operations at the proposed facility over the next 30 years. As part of the plan, the cost effectiveness of these dust control measures was also evaluated.
- Developed a supplemental environmental project to reduce fugitive dust emissions at a large steel facility. This involved determining the feasibility of installing dust control measures and estimating reduction in fugitive dust emissions.
- Provided air permitting services such as preparing Clean Air Act Title V permit applications and permit to install applications. Conducted regulatory rule review for assessing applicability in several California air districts including BAAQMD, SCAQMD, YSAQMD, and MDAQMD.
- Conducted several Prevention of Significant Deterioration (PSD) applicability analyses for facilities contemplating both physical and operational changes. These analyses were conducted for facilities planning expansions and for due diligence purposes.
- Worked with a major oil refinery facility to identify potential PSD-triggering equipment and operational changes, and assisted the facility in addressing potential past permitting issues and in planning current permitting strategies. Also conducted a PSD significance analysis of facility emissions using an EPA-approved Gaussian plume dispersion model (ISCST3) to assist in addressing these issues.
- Conducted analyses to determine Best Available Control Technology (BACT) options for particulate, SO2, and NOx emissions from various process units at a major oil refinery facility.
- Assessed the applicability of California Proposition 65 and AB2588 regulations to a mining operation. All potential stack and fugitive emission sources were identified, source emission rates were calculated, and the off-site impact was estimated using an EPA-approved Gaussian plume dispersion model (ISCST3).
- Provided strategic advice on sampling and analysis methods to evaluate the presence of airborne carbon nanotubes (CNT) from process emissions at a research operation of a large advanced technology company.
- Served as a selected panel member to discuss potential environmental concerns regarding the release of nanoparticles for a special session on nanotechnology at the American Forest and Paper Association (AFPA).
- Assessed the applicability of Occupational Safety and Health Administration (OSHA) and California Division of Occupational Safety and Health (Cal/OSHA) requirements and potential exposure limits associated with a diesel particulate filter cleaner.
- Managed the update of a safety review of low-probability, high consequence occurrences at a Department of Energy (DOE) research laboratory.
- Assisted in the development of a corporate best practices policy for the use and handling of nanomaterials and nanoparticle containing materials that was implemented across the firm's multiple business units.
- Managed the development of health and safety program elements for a leading internet company in the Bay Area with operations in several different states.
- Managed an environmental, health, and safety compliance audit of a consumer pesticide manufacturing operation and lead a team to address compliance deficiencies.

Prior to joining ENVIRON, Douglas held the following positions:

- Post-doctoral Research Engineer, Environmental Services Group, Cytec Industries, Linden, New Jersey

  - Researched bacterial populations in a novel biodegradation reactor system. Analyzed the applicability of a variety of remediation technologies (solidification, air stripping, GAC capture, trickling bed bioreactors) for company-contaminated sites from waste lagoons to contaminated ground water.

- Research Assistant, Dr. Steven Karel, Assistant Professor, Princeton University
  - Researched enhanced biodegradation of chlorinated aromatic compounds by the addition of a secondary substrate to a pump-and-treat system. Developed a model characterizing the process of dual substrate biodegradation with the accumulation of a toxic intermediate. Developed methods for toxicity studies in a 96-well plate reader.

CREDENTIALS

Registrations and Certifications

Registered Professional Engineer (Chemical), California

Certified Industrial Hygienist by American Board of Industrial Hygiene, #8481

California Air Resources Board-Accredited greenhouse gas (GHG) Lead Verifier and Transactions, Oil & Gas, Process Specialist (EO H-12-040)

California Air Resources Board-Accredited Lead GHG Offset Verifier and ozone depleting substances (ODS) Specialist (EO H2-12-162)

Professional Affiliations and Activities

Member, American Institute of Chemical Engineers

Member, American Industrial Hygiene Association

Member, Air & Waste Management Association

Awards

Maryland Distinguished Scholar, 1985-1989

PUBLICATIONS & PRESENTATIONS

Daugherty, D. 2013. Environmental Management Initiatives and Tools to Track Benefits—Examples from Various US Ports. 9th Ports and Terminal Technology Conference, Amsterdam, the Netherlands, November.

Hooven, C., L. Moran, D. Kim, and D. Daugherty. 2013. Local Planning for climate change within regional efforts: a case study at the Port of San Diego. 5th International Seminar of Ports and the Environment, Amsterdam, the Netherlands, November.

Hooven, C., L. Moran, D. Kim, and D. Daugherty. 2013. Port of San Diego Climate Mitigation and Adaptation Plan (Climate Plan) and the Road Ahead. Air & Waste Management Association's Meeting on Climate Change: Impacts, Policy, and Regulation, Herndon, VA. September.

Hall, L. and D. Daugherty. 2013. Are Current Strategies Sufficient to Determine Funding Allocation for California's Cap and Trade Proceeds? Air & Waste Management Association's Meeting on Climate Change: Impacts, Policy, and Regulation, Herndon, VA. September.

Kim, D., J. Forde, and D. Daugherty. 2013. Complexities in Defining Boundaries for Mandatory Greenhouse Gas Reporting. Air & Waste Management Association's Meeting on Climate Change: Impacts, Policy, and Regulation, Herndon, VA. September.

Chan, L. and D. Daugherty. 2013. US Port Air Quality Initiatives: Opportunities for China. China Green Port Technologies Reverse Trade Mission sponsored by US Trade and Development Agency, Long Beach, CA. July.

Daugherty, D. D. and K. Poloncarz. 2012. Effect of Emerging GHG Laws on Major Stationary Sources. CLE International Conference on Greenhouse Gas Emissions, San Francisco. July.

Hooven, C., J. Hirsch, M. White, S. Messner, D. Kim, L. Moran, and D. Daugherty. 2011. San Diego Unified Port District Climate Mitigation and Adaptation Plan (CMAP). Air & Waste Management Association's Meeting on Greenhouse Gas Strategies in A Changing Climate, San Francisco, CA. November.

Harper, P., M. Posson, and D. Daugherty. 2011. Nontraditional Land Uses and Emergency Planning: Challenges Associated with Developing Plans to Mitigate Impacts from Potential Toxic Gas Releases. Presented at AIHce 2011, Portland, Oregon. May.

Daugherty, D.D. 2010. Invited Panel Member: "Economic Recovery, Infrastructure Funding, and Air Quality: Progress or Impasse?", Bay Planning Coalition Workshop, Oakland, CA. September

Daugherty, D.D. 2010. Moderator for Carbon Management Panel: Regulations and Emerging Policies. Climate 3.0, 23rd Annual San Francisco Bay Decisionmakers Conference. April.

Daugherty, D. D. and K. Shea. 2009. Greenhouse Gas Reporting Rule Overview. Power Magazine Webinar. December.

Daugherty, D. D., S. Ramsey, and C. Colville. 2009. Greenhouse Gas Reporting Rule Workshop. ENVIRON, Houston, TX. November.

Daugherty, D. D. 2009. EPA Mandatory Reporting of Greenhouse Gases Rule. Law Seminars International Telebriefing. October.

Daugherty, D. D., M. Keinath, and M. Posson. 2009. A Case Study in Avoiding Pitfalls of Conducting LEED IAQ Testing. Presented at AIHce 2009, Toronto, Canada. June.

Li, W., D. D. Daugherty, and E. Liu. 2009. Evaluation of IEQ for Office Spaces in China Against TVOC Standards. Presented at AIHce 2009, Toronto, Canada. June.

Payer, B. W., S. Lee, G. M. Hoch, and D. D. Daugherty. 2008. Evaluation of Source Selection and Representation for Mobile Emission Source Activities on Air Dispersion Modeling Setup Time, Run Time, and Modeling Results Using AERMOD. Presented at 2008 Annual Meeting, Air & Waste Management Association, Portland, Oregon. June.

Daugherty, D.D. 2008. Introduction to AERMOD Dispersion Modeling. A one and half day course presented in Sydney Australia. May.

Daugherty, D.D. 2008. West Coast Ports Emission Reduction Initiatives. Bay Planning Coalition's 25th Anniversary Decision-makers Conference. April.

Payer, B. W., S. Lee, G. M. Hoch, and D. D. Daugherty. 2008. Assessing the Uncertainty from Source Selection and Representation for Mobile Emission Source Activities in Air Dispersion Modeling Assessment of Goods Movement Facilities. Poster presented at Transportation Research Board of the National Academies Data for Goods Movement Impacts on Air Quality Conference, Irvine. March.

White. M., D. Merk, L. Bentley, J. Lester, and D. D. Daugherty. 2008. Development of a Voluntary Clean Air Program at the Port of San Diego. Poster presented at Transportation Research Board of the National Academies Data for Goods Movement Impacts on Air Quality Conference, Irvine. March.

Daugherty, D. D. and K. Poloncarz. 2008. Going "Carbon Neutral", Legal and Technical Issues Associated with Quantifying, Mitigating, and Offsetting Climate Change Impact. CLE International Green Building Conference, San Francisco. February.

Daugherty, D.D. 2007. Carbon Management – A Case Study Using ENVIRON's Six-Step Plan. Part of ENVIRON seminars, "Optimizing Your Strategic Response to Upcoming Carbon Management Regulations" and "Optimizing Your Strategic Response to AB 32, California's Carbon Management Requirements: Lessons Learned from the EU Experience". October 25 in New York City, January 24 in San Francisco, and January 25 in Los Angeles

Mukai, C., T. Bowie, G. Hoch, and D. Daugherty. 2007. Evaluation of Urban Boundary Layer Parameters in AERMOD or Poorly-Defined Urban Areas. 2007 Annual AWMA Meeting. Pittsburgh, PA. June.

Bentley, L., T. Bowie, G. Hoch, and D. Daugherty. 2007. Specification of Surface Parameter Values for the AERMET Preprocessor for Geographical Areas with Atypical Seasonal Patterns. 2007 Annual AWMA Meeting. Pittsburgh, PA. June.

Daugherty, D.D., D. J. Mundt, K. A. Mundt, R. C. Adams, and A. Santamaria. 2006. A Best Management Practices Approach to Nanoscale Materials and Occupational Health Concerns. 2006 Annual American Institute of Chemical Engineers Meeting. San Francisco, CA. November.

Daugherty, D.D., D. J. Mundt, K. A. Mundt, R. C. Adams, and A. Santamaria. 2006. Guarding the Promise: Managing the Environmental and Occupational Health Uncertainties of Nanotechnology Today. International Conference on Nanotechnology (ICNT) 2006. South San Francisco, CA. November.

Hoch, G., C. Barney, and D. D. Daugherty. 2006. A Case Study In Meteorological Monitoring: Evaluation Of Potential Impacts On Data Quality Using Non-Traditional Data Analysis Techniques. Paper 495. 2006 Annual Meeting, Air & Waste Management Association, New Orleans, LA. June.

Daugherty, D. D. 2006. Nanoproducts – Environmental Fate and Transport. Invited Speaker of Panel Session on Nanotechnology at American Forest and Paper Association meeting. May.

Bowie, T., M. T. Keinath, E. Miesner, C. Stubbs, and D. D. Daugherty. 2006. Validation of the Johnson and Ettinger Vapor Intrusion Model Applied to Commercial Buildings. Presented at AIHce 2006, Chicago, IL. May.

Daugherty, D. D. 2006. Health and Environmental Concerns of Nanotechnology for the Building Industry. Presented at Safety & Health Council, Associated General Contractors of California. April.

Mundt, D. J., K. A. Mundt, A. Santamaria, and D. D. Daugherty. 2006. Regulatory Dimensions of Nanotechnology. Presented at Shook, Hardy and Bacon, Kansas City, MO. February.

Mundt, D. J., K. A. Mundt, R. C. Adams, A. Santamaria, and D. D. Daugherty. 2005. Pragmatic Approaches to Managing Occupational Health Uncertainty. Presented at 2nd International Symposium on Nanotechnology and Occupational Health, Minneapolis, MN. October.

Daugherty, D.D., T. Bowie, G. Hoch, and E. Lu. 2004. Importance of Characterizing Sampling Variation in Fungal Sampling Studies Utilizing Small Sample Numbers. Presented at AIHce 2004, Atlanta, GA. May.

Daugherty, D. D., K. Mertz, and G. Caviness. 2004. Case Study Of A Potency-Weighted Emission Screen. Environmental Progress, Vol. 23(2): pp. 168-177.

Daugherty, D. D. 2003. Mold – A Successful Approach for Property Buyers and Owners/Sellers (Invited). Presented to Wells Fargo Home Mortgage and Chicago Title Company, San Francisco, CA. July

Daugherty, D. D., W. Li, K. Mertz, and S. Hayes. 2003. The Importance of Surface Roughness Selection in AERMOD Modeling for Shoreline Sources. Paper 81161. 2003 Annual Meeting, Air & Waste Management Association, San Diego, CA. June.

Daugherty, D. D., K. Mertz, and G. Caviness. 2003. Case Study Of A Potency-Weighted Emission Screen. Paper 19c. Presented at 2003 AIChE Spring National Meeting, New Orleans, LA. April.

Daugherty, D. D. 2003. Mold – A Successful Approach for Property Buyers and Owners (Invited). Presented at the Real Estate Round Table, San Francisco, CA. January.

Daugherty, D. D. 2002. Special Session on Mold. Presented and Chaired at Air & Waste Management Association Special Symposium on Air Quality Measurement Methods and Technology, San Francisco, CA. November.

Daugherty, D. D. 2002. Mold and Due Diligence. Presented at Environmental Bankers Association Meeting (Invited). St. Paul, MN. June.

Daugherty, D. D., K. Mertz, and G. Caviness. 2002. Case Study Of A Potency-Weighted Emission Screen: Initial Evaluation. Paper 42728. Presented at 95th Annual Meeting, Air & Waste Management Association, Baltimore, MD. June.

Daugherty, D. D. and S. Hayes. 2001. Screening-Level Risk Analyses Of Fluid Catalytic Cracking Units At Twenty-Five Refineries. Paper 504. Presented at 94th Annual Meeting, Air & Waste Management Association, Orlando, Florida. June.

Daugherty, D. D. 2001. Mold – The Initial Investigation. Invited lecture at Golden Eagle Insurance, San Diego, California, and Highlands Insurance Group, Los Angeles, California. January.

Daugherty, D. D. 2000. Mold and Construction Defects. Invited lecture at Bishop, Barry, Howe, Haney & Ryder Annual Silverado Symposium, Silverado, California. May.

Daugherty, D. D. and S. F. Karel. 1994. Degradation of 2,4-Dichlorophenoxyacetic Acid by Pseudomonas cepacia DBO1(pRO101) in a Dual Substrate Chemostat. Applied Environmental Microbiology, 60:3261-3267.

Daugherty, D. D. 1994. Degradation of 2,4-Dichlorophenoxyacetic Acid by Pseudomonas cepacia DBO1(pRO101) in Mixed Substrate Systems. Doctoral dissertation, Princeton University, Princeton, New Jersey. November.

Daugherty, D. D. 1993. Degradation of Chloroaromatic Compounds in the Presence of Additional Substrates by a Model Bacterial System. Seminar presented at Princeton University, Princeton, New Jersey. May.

Daugherty, D. D. 1992. Degradation of 2,4-Dichlorophenoxyacetic Acid in the Presence of Succinate by Pseudomonas cepacia DBO1(pRO101). Presented at AIChE Annual Meeting, Miami Beach, Florida. November.

Daugherty, D. D. 1992. Initial Results of 2,4-Dichlorophenoxyacetic Acid Degradation in the Presence of Succinate by Pseudomonas cepacia DBO1(pRO101). Presented at MABEC Annual Meeting, Rutgers, the State University of New Jersey, New Brunswick, New Jersey. March.

Yi Tian, CIH, CSP, QEP | Senior Manager

Irvine, California
+1 949 798 3624 | ytian@environcorp.com

Yi Tian has over 20 years of consulting experience in occupational and community exposure evaluation, human health risk assessment, indoor air quality investigation and EHS regulatory compliance. She is proficient in air sampling and monitoring; air quality modeling; industrial hygiene principles and evaluation of exposure to chemical, physical, biological and radiological agents; health risk assessment methodologies and risk communication; investigation of causes for occupant complaints in buildings (VOCs, mold and other environmental factors); consumer products exposure and risk assessment as well as regulatory compliance; OSHA compliance audit and program development; and health and safety issues for hazardous waste and construction sites. In the past 20 years, Yi has assisted clients in the manufacturing, utility, real estate and municipality sectors to comply with environmental, health and safety regulations; addressing and responding to employee and community concerns; and meeting the challenges associated with due diligence and litigation.

EDUCATION

1989 MS, Environmental Engineering, University of Cincinnati

1985 BEng, Industrial Hygiene, Beijing Institute of Economics

EXPERIENCE

Indoor Air Quality and Microenvironmental Studies

- Investigated mold and other microbial contaminations in buildings for property owners and property managers, assessed the extent of microbial contamination, and managed abatement through successful completion.
- Managed a mold and moisture intrusion prevention, investigation, and remediation program for a major real estate client that owns and manages properties in 7 states in the U.S. The program included training of the property managers on implementing the Mold Preventative Maintenance Plan, conducting mold and water intrusion investigations, and supervising mold remediation.
- Designed a comprehensive sampling protocol for a hotel in Southern California to evaluate the hotel's infrastructure for potential health risks to guests and employees as a result of microbial growth (fungi and bacteria). Managed ENVIRON staff who implemented the protocol, which included visual inspection, moisture level survey, surface mold sampling, fungal air sampling, and water sampling. The results of the study characterized and quantified the extent of the mold contamination at the hotel. Subsequently supervised the mold remediation and completed the remedial activities successfully under a tight schedule.
- Conducted mold surveys in commercial and office buildings as part of the clients' environmental due diligence efforts. Surveys included visual inspections, interviews with the building engineers and property managers, moisture level surveys, and surface (or bulk) sampling (if necessary) to quantify the building materials affected by water intrusion and fungal growth, identify the potential causes, and estimate the potential costs associated with the problems.
- Performed surface, bulk, and air sampling for viable and non-viable microorganisms (e.g., fungal and bacterial) in commercial and office buildings, as well as residential properties, to evaluate the extent of mold contamination and to quantify the exposures. Recommended mitigation measures, developed remedial clearance criteria, prepared mold remediation protocols, and performed post-remediation clearance inspection and sampling.

- Participated in community town hall meetings on behalf of clients for purposes of exposure and/or health risk communication pertaining to subsurface vapor intrusion, asbestos exposure, and mold.
- Performed numerous indoor air quality sampling and investigations for VOCs (e.g., TCE, PCE, 1,1-DCE, Vinyl Chloride) in hospitals, medical office buildings, churches, universities, and other types of commercial and industrial properties to address various concerns such as subsurface contaminant migration and vapor intrusion to the indoor environment. Using the sampling results, evaluated California Proposition 65 compliance and human health risks for the occupants. In several cases, recommended mitigation measures to reduce the indoor VOC concentrations in order to meet the target health risk thresholds.
- Implemented an Asbestos Management Program for a real estate client that owns properties located in California, Georgia, Maryland, Massachusetts, New Jersey, North Carolina, Pennsylvania, and Washington. The Program was designed to assist the client and its asset management team to better manage the risks associated with the potential exposure to asbestos and to comply with regulatory requirements. The Program included the following key components: comprehensive asbestos survey; operations and maintenance (O&M); abatement specification, air monitoring, and oversight; and proper documentation of the various stages related to asbestos for each building.
- Provided litigation support to asbestos cases throughout California, working with attorneys and other experts in complex situations. Performed extensive document review, researched and compared various asbestos air and bulk sampling and analytical methods, estimated historical exposure (for dose reconstruction), and estimated health risks.
- Managed a demolition level asbestos survey and abatement project for two large bank buildings in Southern California under an extremely tight schedule.
- Prepared asbestos Operations and Maintenance (O&M) programs for several buildings in Denver, Colorado, and provided on-site training to property managers to implement the O&M programs.
- Investigated indoor air quality complaints in many office and commercial buildings. The investigations involved facility inspection, interviews with the employees, ventilation system (HVAC) inspection, indoor air comfort parameters monitoring, chemical and microbial pollutant sampling, and results interpretation.
- Designed and implemented protocols for comprehensive evaluations of building indoor air quality and the effectiveness of the HVAC systems in hotels and office buildings, which included sampling and direct monitoring of various volatile organic compounds (VOCs), respirable particulate matter, comfort parameters, fungi, and bacteria.
- Implemented a statewide residential indoor air quality study of carbon monoxide, nitrogen oxides, radon, benzene, toluene, formaldehyde, air exchange rate, and appliance and housing characteristics for 300 residential sites throughout the state of California, sponsored by the natural gas industry.
- Designed a protocol for measuring radon, supervised the implementation of the protocol, and investigated various radon mitigation techniques for several office buildings located in the suburb of Denver, Colorado.
- Conducted air toxics (carbon monoxide, benzene, toluene, and formaldehyde) sampling and monitoring at 100 gasoline service stations, 25 parking structures, and 10 office buildings (known as microenvironments), which required randomly selected participants in the greater Los Angeles area to provide a scientifically defensible database.

Occupational Health and Safety

- Managing environmental, health and safety compliance work for a major hard-drive manufacturer with multiple locations in the U.S. and in the Asia-Pacific region, including environmental, health and safety audits, air quality compliance assistance, California Proposition 65 compliance evaluation, facility decontamination and decommissioning, and environmental due diligence.
- On-going, multi-year effort to assist a paint and coating manufacturer in the U.S. to comply with the hazard warning requirements in the Canadian Consumer Chemicals and Containers Regulations of 2001 (CCCR). The hazard evaluation process includes extracting data from the Material Safety Data Sheets (MSDS's) for the raw materials and/or contacting the raw material manufacturers or suppliers to gather sufficient information in order to evaluate toxicity (inhalation, dermal, and oral exposure pathways), corrosivity, flammability, and other potentially harmful effects of the final paint and coating products. Finally, proper warning language is developed and recommended to the client following the CCCR for the labels on the products.
- Evaluated the potential safety hazards associated with a bench grinder citation issued by Cal/OSHA at a clothing manufacturer, and based on the evaluation, suggested to the client to appeal. As a result, the level of violation was reduced from serious to general and fines were reduced as well.
- Performed a job safety analysis (JSA) for a battery recycling facility (lead smelter) located in Southern California. About 150 tasks/jobs in eleven departments were observed and each task was analyzed for the associated potential hazards (e.g., physical, chemical, electrical, ergonomic, etc.). Available existing controls were evaluated (e.g., personal protective equipment [PPE]) and new controls were recommended (e.g., engineering controls). Also provided JSA training to the supervisors and key personnel so that the facility can conduct its own JSA and implement the program.
- Established a comprehensive health and safety program for a new aerospace testing facility from "ground zero," which included providing compliance advice to the facility, preparing 14 Cal/OSHA required safety programs, conducting safety inspections, providing training to the employees, and assisting the facility to implement the written programs (e.g., establishing a safety management structure, conducting regular safety committee meetings, conducting periodic inspections, reporting work related incidences, correcting hazardous conditions, recordkeeping, etc.).
- Evaluated compliance status with the federal and/or California OSHA regulations at many industrial and manufacturing facilities (e.g., asphalt, chemical, pharmaceutical, food, metal and plastic processing, crane rental/repair, floor covering/carpet, toy, and electronic). Assisted the clients to correct the deficiencies identified during the audits, including workplace hazard assessment, establishing worker exposure and industrial hygiene baseline data, machine guarding, process safety management, and OSHA-required programs development and implementation.
- Supervised numerous workplace exposure assessment projects to evaluate personal exposures to a variety of chemical, physical, and biological hazards. Chemicals included various volatile organic compounds, semi-volatiles, metals, asbestos, and metalworking fluids. Physical hazards included heat stress, lighting, and noise. Biological hazards included bio-aerosols, fungi, bacteria, and biological allergens. A variety of active/passive air sampling, surface sampling, and other sampling techniques as well as direct reading monitoring devices were used.
- Conducted a large-scale worker exposure evaluation for a client with multiple sites in the U.S. Studies involved selecting workers and work areas to be monitored for diesel exposure. Samples were collected and analyzed for elemental and organic carbon (NIOSH Method #5040, 37-mm pre-fired quartz-fiber filters, thermal optical analytical method). In addition to the particulate fraction, three to four representative VOCs (such as benzene, formaldehyde, and 1,3-butadiene) and one or two metals (such as arsenic and lead) were also sampled and

analyzed. The results were compared to the established occupational standards (either OSHA's PEL or ACGIH's TLV) to evaluate the worker exposure. Also recommended exposure reduction and potential mitigation measures to the EHS management team.

- Conducted noise monitoring at many industrial facilities and construction sites using noise dosimeters and/or sound level meters to evaluate worker exposures. Recommended noise mitigation measures and prepared hearing conservation programs as required by OSHA.
- Prepared, reviewed, and commented on site-specific health and safety plans for many large remediation and Superfund sites throughout the U.S. and provided health and safety consultation for the site investigation and remediation activities.
- Supervised several facility DDD (decommission, decontamination, and declaration) projects, which included sampling and evaluation of the surface contaminations, developing risk-based cleanup criteria, managing subcontractors, performing clearance sampling, and reporting.

Health Risk Assessment

- Evaluated the potential off-site impacts from an existing municipal solid waste landfill in San Diego County, which included human health risk, nuisance dust, odor, and noise evaluation. Air emission sources included stationary sources, on-site (off-road) mobile sources, and on-road vehicles.
- Conducted a human health risk assessment for a housing development near the U.S. / Mexico border, which included waste water sampling, emission estimation using Water9, air dispersion modeling, and health risk evaluation for the residents near an existing municipal waste water treatment plant.
- Provided technical expertise (including air sampling, air dispersion modeling, surface wipe sampling, and risk assessment) for California Proposition 65 compliance and litigation cases for a large variety of clients including industrial facilities, schools, and public buildings. The chemicals evaluated included diesel exhausts, toxic metals (e.g., arsenic, cadmium, and lead), as well as benzene, formaldehyde, and various organic solvents.
- Prepared air toxics emissions inventories (ATIP & ATIR) and health risk assessments (HRAs) using computer models (such as ACE2588) under the requirements of the California Air Toxics "Hot Spots" regulation (AB2588). Clients included petroleum oil refineries, chemical manufacturers, Portland cement manufacturing facilities, aerospace industry, foundries, semiconductor manufacturers, and hospitals.
- Supervised air emission source tests for the spray booths at an automobile repair facility in Pico Rivera and performed health risk assessments using the source test results to respond to public concerns. Presented the health risk assessment results to the City Council and to the concerned citizens in town hall meetings. Evaluated nuisance and odor problems in addition to the health risks using air dispersion modeling technique. Recommended modifications to the spray booth stacks in order to solve the odor problems, which was the least expensive mitigation measure. Interviewed by and quoted in the Whittier Daily News for this work.
- Conducted a human health risk assessment (HRA) for a gas distribution facility in Southern California as a result of odor complaints from the nearby residents. The majority of the air emission sources at the facility were diesel combustion engines. PM emissions from the diesel engines were estimated using the manufacturer specification data, and the speciated VOC emissions were estimated using standard emission factors. The maximum cancer risk and non-cancer chronic hazard index were both less than significant; however, the acute hazard index was greater than 1.0 due to acrolein emissions, which could have contributed to the odor issues.
- Conducted an HRA for a proposed project consisting of four diesel-fired internal combustion engines at a facility in El Segundo, California. The HRA was prepared to evaluate the project's compliance with the California Proposition 65. Diesel particulate matter was used as a surrogate for all air toxics in the diesel combustion

exhausts. ISC-PRIME, a detailed air dispersion modeling software with enhanced plume rise algorithm was used to estimate the concentrations at downwind receptor locations. The results of the HRA indicated that the predicted cancer risk is below the ten in a million "No Significant Risk Level" established in Proposition 65 at the maximally exposed commercial and residential off-site receptors.

- Managed several HRA projects for sites with known subsurface contamination, and estimated the potential health risks for the occupants of the buildings located at or nearby the sites.
- Prepared HRAs for hazardous waste treatment, storage, or disposal (TSD) facilities in Southern California required by the Cal/EPA DTSC as part of their RCRA Part B permit applications.
- Prepared HRAs for a variety of industrial clients in accordance to the SCAQMD Rule 1401 in order to obtain air permits for the clients.
- Prepared Preliminary Endangerment Assessments in accordance to the DTSC Guidance in order to obtain site closure status for the clients or to enable a property transfer.

Ambient Air Quality

- Managing the air quality and human health risk assessment portion of the CEQA EIR and NEPA EIS for the proposed expansion of the I-710 Freeway from Ocean Boulevard in Long Beach to the 60 Freeway to be completed around 2035, coordinating with the project funding partners (Metropolitan Transportation Authority [Metro], California Department of Transportation [Caltrans], Gateway Cities Council of Governments, Port of Los Angeles, Port of Long Beach, Southern California Association of Governments, and I-5 Joint Powers Authority), communicating with the reviewing agencies including the FHWA, EPA, ARB, and SCAQMD, and directing a multi-office ENVIRON technical team.
- Project manager and client's point of contact for the Metropolitan Water District of Southern California, responding to client's inquiries, maintaining the Master Service Contract with multiple tasks, and directing technical work in the areas of SCAQMD and California State air quality permitting and compliance issues.
- Conducted an odor study for a municipal solid waste transfer and recycling facility located in Southern California. Whole air samples were collected from the sources of odor and the samples were evaluated by a trained odor panel at a laboratory to estimate Detection Thresholds and Recognition Thresholds. An air dispersion model was used to estimate downwind odor strengths at locations where odor complaints were registered. Several possible source configurations and controls were evaluated for purposes of minimizing the odors at the receptors.
- Implemented an 8.5-year ambient air monitoring and community outreach program for the Port of Long Beach. The monitoring program consisted of particulate matter fallout sampling, meteorological condition monitoring, and road dust sampling. The outreach element of the program included presentations at high schools in the City of Long Beach and regular meetings with the Community Consultative Committee. Effectively interacted with the Port Planning Division, community representatives, subcontractors, and ENVIRON staff to ensure adherence to the study objectives, protocol, and schedule. Also presented at the Air & Waste Management Association and American Industrial Hygiene Association annual conferences to share the fallout study's methodology and results with the technical community and to increase the awareness of the Port's effort.
- Worked on several projects for the Port of Long Beach since 1998, including the Cost Effectiveness Evaluation of Proposed Infrastructure and Operational Improvements for Petroleum Coke Handling, SCAQMD Rule 1158 and AB 1775 regulatory analyses, as well as reviewing various technical reports for the Port.
- Managed numerous air quality impact analysis and modeling projects for permitting and compliance purposes using air dispersion models such as AERMOD, CALPUFF, ISCST, SCREEN, CALINE3, EMFAC, TSCREEN,

VISCREEN, DEGADIS, ALOHA, and SLAB, and recommended mitigation measures, as appropriate, to reduce the ambient air quality impact.

- Assisted Portland cement manufacturers to obtain permits to operate in air quality attainment areas, which required comprehensive air quality impact analyses under the prevention of significant deterioration (PSD) regulation.
- Assisted numerous clients to successfully obtain their air permits from the SCAQMD (including Title V permits) and other air districts (e.g., BAAQMD, VCAPCD, KCAPCD, and SDAPCD) in a timely fashion and to comply with both local and federal air quality regulations for criteria pollutants and air toxics.
- Contributed air quality impact analysis for criteria pollutants, health risk assessment for air toxics, noise, and hazard analysis sections to environmental impact reports (EIRs) for projects that triggered the California Environmental Quality Act (CEQA) requirements. Also prepared other CEQA documents for various clients, such as initial study, negative declaration, or mitigated negative declaration.
- Prepared fugitive dust control plans for construction sites regulated by the SCAQMD Rule 403. These dust control plans include the identification of one or more of the applicable best available control measures (BACM) to minimize the generation of fugitive dust from earth-moving activities.
- Designed site perimeter air monitoring programs for upwind/downwind PM_{10} sampling and monitoring, as well as pesticides, metals, radiological isotopes, and other air toxics, to ensure insignificant off-site impacts on the surrounding communities.
- Processed over 3,200 Rule 219 permit applications as a subcontractor to and for the SCAQMD. The permit equipment included internal combustion engines, boilers, and open process tanks.
- Researched and applied receptor modeling techniques to particulate contamination in clean rooms (i.e., source identification and source apportionment). Results were published in peer-reviewed scientific journals.

Project Work in China and Asia/Pacific

- Managed an indoor environmental quality, water intrusion, and mold investigation and remediation project for a university center in Beijing. The project implemented a remedial protocol following standard practice in the U.S. such as containment, personal protective equipment, remedial techniques, and post-rememdiaton verification.
- Managed a worker exposure monitoring project for a transnational specialty chemical company in its batch processing facilities in Thailand, The Philippines, China, Indonesia, and Japan.
- Conducted worker exposure monitoring at the BBA Nonwovens facility in Tianjin and the Budweiser facility in Wuhan; exposure assessment included total and respirable particulate matter, noise, and heat stress.
- Provided on-the-job training to the industrial hygienists of ENVIRON's China Division and supervised the technical quality of the IH projects in China.
- Collaborated with ENVIRON's China Business Unit and taught a two-day industrial hygiene seminar in Beijing and Shanghai, respectively, in September 2005, to ENVIRON's clients and potential clients in China. Seminar topics included worker exposure monitoring of chemical, physical, and biological hazards; health effects; indoor air quality; and asbestos.
- Established industrial hygiene capability for ENVIRON's China Business Unit. On-going responsibilities include business development and marketing, proposal review, recruiting, worker exposure monitoring protocol design, and report review, as well as preparation of OSHA compliance programs such as Hearing Conservation Program, Heat Stress Plan, etc. Representative clients include BBA (China) Airlaid Co., Ltd., Budweiser Wuhan International Brewing Company, Ltd., Alcoa Aluminum (China), ITT Cannon, and Eastman Chemical.

- Conducted environmental site assessments and compliance audits at three manufacturing facilities in China (Beijing, Shanghai, and Dalian), which was a due diligence effort initiated by the corporation's headquarters in Germany.

CREDENTIALS

Registrations and Certifications

Certified Industrial Hygienist, American Board of Industrial Hygiene (CIH #7596)

Certified Safety Professional, Board of Certified Safety Professionals (CSP #23240)

Qualified Environmental Professional, Institute of Professional Environmental Practice (QEP #12960275)

Engineer-In-Training, State of California (EIT #XE099559)

Air Quality Management Certificate, University of California, Irvine

Competent Toastmaster (CTM), Toastmasters International, Irvine Club

Professional Affiliations and Activities

Member, Air & Waste Management Association (National and Local)

Member, American Industrial Hygienist Association (National and Local)

Member, The Auditing Roundtable

Member, Southern California Chinese-American Environmental Protection Association

Member, Southern California Society for Risk Analysis

PUBLICATIONS & PRESENTATIONS

Investigation of Formaldehyde Exposure from the Use of Cleaning Products Containing Orange Oil; presented at the American Industrial Hygiene Conference and Exposition, Minneapolis, Minnesota, on June 4, 2008; available from the AIHA multi-media conference proceedings.

Petroleum Coke Fallout Study in Long Beach, California (Five-Year Results); presented at the American Industrial Hygiene Conference and Exposition, Anaheim, California, May 25, 2005; available from the AIHA conference proceedings.

Petroleum Coke Fallout Study in Long Beach, California – Part II: Three-Year Results; presented at the Air & Waste Management Association 96th Annual Conference, San Diego, California, June, 2003; published in the conference proceedings (CD-ROM).

A Radon Survey Conducted in Two Office Buildings in Denver, Colorado; presented at the American Industrial Hygiene Conference and Exposition, San Diego, California, June, 2002; published in the conference proceedings and AIHA's website.

Petroleum Coke Fallout Study in Long Beach, California – Part I: Methodology; presented at the Air & Waste Management Association 94th Annual Conference, Session #AS-3b, Paper #388, Orlando, Florida, June, 2001; published in the conference proceedings (CD-ROM).

Carbon Monoxide Concentration Distributions Inside and Outside of Residences in California; submitted to the Journal of Air & Waste Management Association, 1997.

California Residential Air Exchange Rates and Residence Volumes; published in the Journal of Exposure Analysis and Environmental Epidemiology, Vol.6, No.3, 1996.

Benzene and Toluene Concentrations Inside and Outside of Homes in California; presented at the Air and Waste Management Association 87th Annual Conference, 94-WP90.03, Cincinnati, 1994; published in the conference proceedings, Vol. 2.

Carbon Monoxide Concentrations Inside and Outside of Homes in California; presented at the Air and Waste Management Association 87th Annual Conference, 94-WP90.04, Cincinnati, 1994; published in the conference proceedings, Vol. 2.

California Residential Indoor Air Quality Study: Methodology; presented at the Air and Waste Management Association 87th Annual Conference, 94-WP90.05, Cincinnati, 1994; published in the conference proceedings, Vol. 2.

California Residential Indoor Air Quality Study: An Overview; presented at the Air and Waste Management Association 87th Annual Conference, 94-WP90.06, Cincinnati, 1994; published in the conference proceedings, Vol. 2.

Formaldehyde and Nitrogen Dioxide Concentrations Inside and Outside of Homes in California; presented at the Air and Waste Management Association 87th Annual Conference, 94-WP90.01, Cincinnati, 1994; published in the conference proceedings, Vol. 2.

Radon Concentrations Inside California Homes; presented at the Air and Waste Management Association 87th Annual Conference, 94-WP90.02, Cincinnati, 1994; published in the conference proceedings, Vol. 2.

California Residential Indoor Air Study - Part II: Results of Benzene and Toluene; presented at the Pacific Conference on Chemistry and Spectroscopy Air Quality Measurements Symposium, October 20-22, 1993, Pasadena, California.

Chronic Disease Associated with Long Term Concentrations of Nitrogen Dioxide; published in the Journal of Exposure Analysis and Environmental Epidemiology, Vol.3, No.2, 1993.

Public Exposure to Organic Vapors in Los Angeles; presented at the Air & Waste Management Association and EPA/AREAL Symposium: Measurement of Toxic and Related Air Pollutants, May 4-8, 1992, Durham, North Carolina; published in the meeting proceedings.

Principal Component Analysis for Particulate Source Resolution in Clean Rooms; published in the Journal of Environmental Science, November/December, 1989.

Receptor Modeling for Contaminant Particle Source Apportionment in Clean Rooms; presented at the 19th Annual Meeting of the Fine Particle Society, July, 1988, Santa Clara, California; presented at the American Association for Aerosol Research 1988 Annual Meeting, October, 1988, Chapel Hill, North Carolina; and published in the Aerosol Science & Technology, Vol.12, No.4, 1990.

Fan Xu, PhD, CIH | Senior Associate

Los Angeles, California
+1 213 943 6343 | fxu@environcorp.com

Dr. Fan Xu is a Senior Associate at ENVIRON, specializing in industrial hygiene and air quality, with experience in occupational exposure assessments, human health risk assessments, indoor air quality investigation, air dispersion modeling, and ergonomics assessments. She is well versed in air monitoring techniques and equipment and has conducted air monitoring and sampling in various industrial, commercial, and residential settings. She also has experience in OSHA and Cal/OSHA compliance program development and conducting Job Safety Analysis. Fan serves as the Health and Safety Coordinator for ENVIRON's Los Angeles office and provides assistance in implementing the internal Health and Safety Program in Southern California. Fan is a Board Certified Industrial Hygienist (CIH).

EDUCATION

2005 PhD, Industrial Hygiene, Purdue University, Indiana

2001 MEng, Environmental Engineering, Nankai University, Tianjin, China

1998 MS, Environmental Science, Nankai University, Tianjin, China

EXPERIENCE

Air Sampling and Monitoring

- Conducted industrial hygiene exposure assessment for various manufacturing facilities. The assessed contaminants included welding fumes, various VOCs, acids, particles, fiberglass, etc. Evaluated the exposure conditions by comparing with OSHA and Cal/OSHA PELs and provided control measures and recommendations.
- Developed and performed hydrogen sulfide real-time monitoring at a commercial property to evaluate the ambient hydrogen sulfide concentrations to address the odor compliance from the customers and workers.
- Participated in an on-going multi-year ambient air monitoring and community outreach program for the Port of Long Beach. The monitoring program consists of particulate matter fallout sampling, meteorological condition monitoring, and road dust sampling.
- Conducted baseline PM real-time monitoring for a construction/demolition project near an elementary school.
- Assisted in a couple of industrial hygiene monitoring projects in China and southern Asia.

Health Risk Assessments and Air Dispersion Modeling

- Conduct AB2588 health risk assessments for a secondary lead smelting facility. Utilized the AERMOD software to conduct air dispersion modeling and the HARP software provided by SCAQMD to perform the health risk assessment.
- Conducted human health risk assessments for off-site impacts from an existing municipal solid waste landfill, and from a foundry facility. Estimated air emissions from mobile sources, stationary sources, and line sources. Utilized the HARP software perform the risk estimation.
- Performed human health risk assessments for industrial and commercial properties with indoor air impacts from subsurface vapor intrusion. Constructed different exposure scenarios and evaluated the risk by comparing with OEHHA CHHSLs and other exposure criteria.

- Performed air dispersion modeling and health risk assessments for I-710 freeway expansion project. Estimated air emissions from mobile sources using traffic data and mobile source emission profiles.
- Performed air dispersion modeling and health risk assessments for a biomass-based fuel and power production facility for CEQA analysis.
- Conducted AB2588 analyses for stationary diesel engines at water facilities.

Indoor Air Quality

- Conducted extensive indoor air quality monitoring to assess the impacts from subsurface vapor intrusion at a residential area.
- Performed indoor air monitoring to evaluate the formaldehyde generation during the use of a cleaning product. Formaldehyde, ozone, and d-limonene were investigated for their concentration changes over the cleaning process.
- Conducted various mold surveys in commercial and office buildings. Surveys included visual inspections, interviews with the building engineers and property managers, moisture level surveys, and surface and air sampling. Developed the remediation plans and provided oversight for remediation activities.
- Conducted indoor air investigations to address tenants concerns. Provided technical opinions for the concerns and suggestions for remediation.

Other Experiences

- Provided onsite HS support for an energy company. Assisted the company EHS manager for various EHS issues, including internal safety auditing, confined space evaluation, legionella surveys, AQMD rule compliances, etc.
- Performed qualitative and quantitative industrial hygiene assessments for a cancer diagnostic facility.
- Provided oversight for a three-phase asbestos remediation project at a 14-acre vacant site. Conducted surface and subsurface soil investigation to evaluate the extent of contamination. Assisted in strategy development for remedial options.
- Conducted a comprehensive Job Safety Analyses (JSA) for a lead smelter facility. Assisted in the JSA training for the facility supervisors.
- Conducted chemical toxicity evaluation for the paint and paint removing products to comply with the requirements regulated by Canadian Consumer Chemicals and Containers Regulations.
  - Prepared an emergency response plan for a retail store in the near vicinity of a power generating plant.
  - Prepared industrial wastewater discharge permit application for a hair care product manufacturer.
  - Prepared an Annual Emission Report for a foundry facility.
  - Conducted AQMD Rule 1472 evaluation for water facilities.

Prior to joining ENVIRON, Dr. Xu has been involved in the following projects at Purdue University, Indiana, and Nankai University, China:

- Performed personal particulate exposure monitoring and assessments for the workers at two pharmaceutical research and development plants and personal VOC exposure monitoring at university laboratories. Evaluated the impacts of worker's activities and operations on the variations of the exposure levels. Assisted in the development and test of the wireless video exposure monitoring system developed at Purdue University.

- Conducted noise survey and assessment for a plant manufacturing electrical resistors. Evaluated the noise exposure level by comparing with OSHA PELs.
- Performed ergonomics assessments for various workplaces: a trailer manufacturing facility; an aluminum manufacturing facility; a dental clinic office; and a bread shop.
- Conducted environmental impact assessments at China for various environmental settings, including a sulfate manufacturing facility; an international container transportation facility; and a new economic and technical developing area. Performed environmental evaluation for impacts of air, water, and noise.
- Conducted environmental economic analysis for the industrial wastewater reuse policy of a port city of China. Evaluated the advantages of wastewater treatment and reuse from the aspect of natural resource reuse and health concerns.

CREDENTIALS

Professional Affiliations and Activities

Member, American Industrial Hygiene Association

AWARDS

Purdue Research Foundation Fellowship, 2004

Chicago Section AIHA Awards Scholarship, 2003

PUBLICATIONS & PRESENTATIONS

James D. McGlothlin, Fan Xu, Sandra S. Cole, Real-Time Assessment of Air Contaminants Using Video Exposure Monitoring Methods and Techniques, Pattys' Industrial Hygiene, Vol(2), 6th edition, 2010.

James D. McGlothlin, Fan Xu, Alina Goh, Keith D. Tate, Sarah R. Jones, Video Exposure Monitoring: A Complementary Instrument for Control Banding in the Pharmaceutical Industry, the 6th International Scientific Conference of the International Occupational Health Association, North West Province, South Africa, 2005.

Fan Xu and James.D. McGlothlin, Video Exposure Assessments of Solvent Exposures in University Pharmaceutical Laboratories—A Pilot Study, Chemical Health and Safety, 10 (6): 23-28, 2003.

Tan Zhu, Fan Xu, He Xu, Method and Application of Environmental Valuation, Shanghai Environ. Sci. (cn), 19: 458-460, 2000.

He Xu, Tan Zhu, Shugui Dai, Fan Xu, Strategic Environmental Assessment and Sustainable Development, Urban Environment and Ecology (cn), 4(2):36-38, 2001.

Identification and Assessment of Workplace Conditions Contributing to Higher Exposure to Solvents in the Pharmaceutical Lab Using Video Exposure Assessment System, AIHce, Texas, 2003.

Work-Related Particulate Exposure during Pharmaceutical Operations, Fan Xu, James D. McGlothlin, AIHce, Anaheim, CA, 2005.

Using Real-Time Video Exposure Monitoring to Validate Control Banding in Pharmaceutical Research Facilities, James D. McGlothlin, Fan Xu, 2nd International Control Banding Workshop: Validation and Effectiveness of Control Banding, Cincinnati, OH, March 1-2, 2004.

Rod Bronstein, CAC, LBP-A/I | Senior Associate

Irvine, California
+1 949 798 3617 | RBronstein@environcorp.com

Rod Bronstein is a Senior Associate at ENVIRON, specializing in industrial hygiene. Rod has over 24 years with experience in occupational exposure assessments, indoor air quality investigation, Asbestos and mold surveys and remediation techniques. He is well versed in air monitoring techniques and equipment and has conducted air monitoring and sampling in various industrial, commercial, and residential settings. He has conducted Legionella surveys in resort hotels and office buildings and site safety in conjunction with industrial hygiene monitoring during emergency responses including the Exxon and Huntington Beach oil spills.

Rod is a certified California Department of Public Health (CDPH) Lead Base Paint Inspector-Assessor (LBP-I/A) and a California certified Asbestos Consultant (CAC).

EDUCATION

BS, Environmental Occupational Health, California State University Northridge (CSUN)

AS, Science, West Los Angeles Community College

USNR-R–Preventive Medicine Technician (Retired)

EXPERIENCE

Air Sampling and Monitoring

- Conducted industrial hygiene exposure assessment for various manufacturing facilities. The assessed contaminants included foundries, various VOCs, acids, particles, fiberglass, etc. Evaluated the exposure conditions by comparing with OSHA and Cal/OSHA PELs and provided control measures and recommendations.
- Developed and performed hydrogen sulfide real-time monitoring at commercial and luxury condominium properties to determine if hydrogen sulfide concentrations were infiltrating into occupied spaces from the building sewer system to address the odor complaints.
- Designed and implemented industrial hygiene asbestos remediation and monitoring projects in the United States and China.

Indoor Air Quality

- Conducted extensive indoor air quality monitoring that included ventilation air flow measurements, chemical and environmental sampling.
- Conducted numerous mold surveys and remediation oversight in various commercial and residential buildings. Surveys included visual inspections, interviews with the building engineers and property managers, moisture level surveys, and surface and air sampling. Developed the remediation plans and provided oversight for remediation activities.
- Conducted indoor air investigations to address tenants concerns. Provided technical opinions for the concerns and suggestions for remediation.

Prior to joining ENVIRON, Rod performed the following:

Conducted One Day Training Seminars: 1994-1997 "OSHA Compliance Update in California"
Subject matter included overviews of the following:

- Ergonomics
- Blood borne Pathogens
- Lock-out/Tag-out
- Confined Space
- Fall Protection
- Process Safety Management

Military Service: United States Navy Active (1975 – 1979) Reserves (December 1979 – 2000) Retired

- Hospital Corpsman - Conducted health and safety inspections, physical exams, and provided emergency medical treatment; conducted annual physical exams with audiometric testing, maintained health records and medical readiness of the Navy personnel; received training in general administration, shipboard damage control, provided training to staff on occupational environmental health, and medical procedures.

USNR (Subject Matter Expert) Trainer to Medical Personnel: 1992-2000

- 40 hour hazardous waste training
- Sanitation and Pest Control
- Blood borne Pathogens
- First Aid/CPR
- Medical Procedures
- Safety

CREDENTIALS

Professional Affiliations and Activities

Member, American Industrial Hygiene Association—AIHA

Member, American Conference of Industrial Hygienists—ACGIH

PUBLICATIONS & PRESENTATIONS

Fedoruk MJ, Bronstein R, Kerger BD. Ammonia Exposure and Hazard Assessment for Selected Household Cleaning Product Uses. J Expo Anal Environ Epidemiol 2005; 15(6):534–544.

Fedoruk MJ, Bronstein R, Kerger BD. Benzene Exposure Assessment for Use Of A Mineral Spirits- Based Degreaser. Appl Occup Environ Hyg 2003; Oct; 18(10):764–871.

Shum M, Bronstein R. Mold—It's Not New—It Only Seems That Way. Michigan Defense Trial Counsel, Inc., 19(3), January 2003.

Fedoruk MJ, Bronstein R, Kerger BD. VOC Exposure Assessment For Government Inspectors At Gas Stations. Presented at the Society of Toxicology Annual Meeting, Baltimore, MD,, March 22, 2004. Toxicological Sciences, Abstract #516, 78(1-S):106, March 2004.

Kerger BD, Bronstein R, Fedoruk MJ. *Exposure Assessment Of Vocs And Metals For Government Inspectors At Auto Body Repair Facilities*. Presented at the Society of Toxicology Annual Meeting, Baltimore, MD, March 22, 2004. Toxicological Sciences, Abstract #517, 78(1-S):106–107, March 2004.

Wade Richard L., Jokar Amir, Cydzik Kristina, Dershowitz Adam, Bronstein Rod. *Wildland Fire Ash and Particulate Distribution in Adjacent Residential Areas*. International Journal of Wildland Fire (2013), http://dx.doi.org/10.1071/WF12062.

Appendix C

Health, Security, Safety and Environmental Pre-Qualification Form

Requesting Company: ENVIRON International Corporation	
Health, Security, Safety, and Environmental "HSSE" Pre-qualification	
Legal Company Name: ENVIRON International Corporation	**Industry Classification Code(s):**
Company Address: 18100 Von Karman Ave., Suite 600	**City:** Irvine
State/Province: CA	**Zip/Postal Code:** 92612
Country:	**Phone No(s):** 949-261-5151
HSSE Contact Person: Mark Watka, CIH	**Fax Number:**
Internet Access? (Y/N): Y	**Company website:** environcorp.com
If Yes, e-mail address: MWatka@environcorp.com	
Please list any previous Company names used in the last 3 years: N/A	

Work References

1) If your company has performed work for the Santa Monica-Malibu School District in the past:

Approximate completion date of work last performed: _____

Business Unit and Location where work was performed: _____

Requesting Company Representative who was responsible for the project: _____

2) If your company has never performed work for the District, please provide two references who may be contacted to provide information regarding past performance.

Company_____ Contact Person_____ Phone_____

Name of Project and Value: _____

Company_____ Contact Person_____ Phone _____

Name of Project and Value: _____

DTSC	POLB
Bill Bosan	Allyson Teramoto
(714) 484-5399	(562) 283-7100
Varied	Varied

HSSE Statistics

Provide the following HSSE statistics for all your company's operations. Refer to the HSSE statistic instructions on page 3.

(A) Reporting year	2013	2012	2011	2010
(B) Average Number of Employees		1006	977	887
(C) Total annual man hours worked for this reporting entity (for all customers, not just Requesting Company)		1,786,699	1,663,258	1,629,152
(D) Number of Recordable Cases		7	6	4
(E) Incident Rate of Recordable Cases		0.78	0.72	0.49
(F) Number of Days-Away-From-Work Cases		2	1	2
(G) Incident Rate of Days-Away-From-Work Cases		0.22	0.12	0.25
(H) Number of Days Away from work		19	7	4
(I) Severity Rate		2.13	0.84	0.49
(J) Number of Fatalities		0	0	0
(K) Vehicle Accident Rate *		NA	NA	NA
(L) Total number of Vehicle Accidents *		NA	NA	NA
(M) Total miles driven *		NA	NA	NA
(N) Worker's Compensation Experience Modification Rate		0.98	1.00	0.74

Please provide a copy of your company's OSHA 300 logs. **Please provide** a letter from your insurance carrier indicating your worker's compensation experience modification rate.

Comments and/or clarifications on above data (if any):
Data for 2013 is not yet completed. * ENVIRON does not currently track statistics for vehicle accidents or total miles driven.

HSSE STATISTICS INSTRUCTIONS

(A) YEAR: As shown.

(B) Average # of Employees: List the average # of employees who worked during the year. An employee shall be defined as any person engaged in activities for an employer from whom direct payment for services is received. Include working owners and officers.

(C) Employee Hours: List the total number of hours worked during the year by all employees, including those in operating, production, maintenance, transportation, clerical, administrative, sales and all other activities.

(D) Number of Recordable Cases: List the total number of Recordable cases that occurred in that year. Recordable Cases include: Fatalities, Days Away From Work Cases, Restricted Work Cases and Medical Treatment cases as defined by OSHA Part 1904 Recording and Reporting Occupational Injuries and Illnesses: http://www.osha-slc.gov/recordkeeping/1904_record_report.pdf

(E) Incidence Rate of Recordable Cases: $\frac{\textit{Number of Recordable Cases X 200,000}}{\textit{Employee Hours}}$

(F) Number of Days-Away-From-Work Cases: List the total number of Days-Away-From-Work cases that occurred during the year. A Days-Away-From-Work case will be defined as any Recordable Case that results in death or lost workdays with days away from work.
For the purpose of this questionnaire, Recordable cases that result in days with restricted activity should not be added in this column. Only Recordable cases that result in one or more days away from work should be counted.

(G) Incidence rate of Days-Away-From-Work cases: $\frac{\textit{No. of Days-Away-From-Work cases X 200,000}}{\textit{Employee hours}}$

(H) Number of Days Away from work:
List the total number of Days-Away-From-Work experienced by all employees during the year. For the purposes of this questionnaire, lost workdays with restricted activity should not be added in this column. Only Recordable cases that result in one or more days away from work should be counted.

(I) Severity Rate $\frac{\textit{Total number of Days Away from work X 200,000}}{\textit{Employee Hours}}$

(J) Number of Fatalities: List the total number of fatalities that result from occupational injuries or illnesses. Deaths that occur in the workplace but are not the result of occupational injuries or illness should not be included.

(K) Vehicle Accident Rate: $\frac{\textit{Total Vehicle Accidents X 1,000,000}}{\textit{Total Miles Driven}}$

(L) Total number of vehicle accidents: List the total number of vehicles accidents that occurred during the year for all vehicles operated by your employees. A vehicle accident is defined as an accident involving a motor vehicle resulting in injury, or loss/damage, or harm to the environment, irrespective of whether the accident was preventable or non-preventable. Excludes circumstances where: 1) vehicle was legally parked, 2) travel is to or from the driver's normal place of work and home (i.e. commuting), 3) Minor wear and tear, 4) vandalism or theft.

(M) Total miles driven: List total miles driven for all vehicles operated by your employees.

(N) Worker's Compensation Experience Modification Rates: Please provide a letter from your insurance carrier.

Regulatory Compliance

1) **Has your company received any HSSE related notice of violations ("NOVs"), or citations within the past 3 years?** *(do not include contested citations later dismissed)* Yes ☐ No ☒

If yes, please provide the following information:

Number of citations or NOVs: _____

Date(s) of above citations or NOVs: _____

Agency issuing citation or NOVs: _____

Nature of citations or NOVs: _____

Have these citations or NOVs been resolved? _____

Comments and/or clarifications on above data (if any): _____

2)	Does your company have a program for determining, which HSSE regulations apply to your company's work activities?	Yes ☒	No ☐
3)	Does your company have a procedure for identifying people who must know about or be trained regarding HSSE regulations?	Yes ☒	No ☐
4)	Does your company have a process for managing subcontractor HSSE compliance with regulations?	Yes ☒	No ☐

HSSE Programs			
1)	Has your company developed and implemented a formal HSSE Program? Please provide a PDF electronic copy of the program.	Yes ☒	No ☐
2)	Does your company have a clearly written safety policy endorsed by upper management?	Yes ☒	No ☐
3)	Does your company have a formalized observation or other type of behavioral safety program? If yes, name of program_____	Yes ☐	No ☒
4)	Does your company have a written procedure in place for communicating and assuring that all personnel and subcontractors understand their obligations to stop work that is unsafe?	Yes ☒	No ☐
5)	Does your company develop site specific HSSE plans for projects?	Yes ☒	No ☐
6)	Does your company have scheduled, documented employee safety meetings?	Yes ☒	No ☐
7)	Does your company's management actively communicate HSSE expectations, monitor HSSE performance, and develop plans for continuous improvement?	Yes ☒	No ☐
8)	Does your company hold on-site (tailgate/toolbox/pre-tour) safety meetings?	Yes ☒	No ☐
9)	Does your company perform detailed JSA's?	Yes ☒	No ☐
10)	Does your company have a written incident investigation system in place to investigate and document incidents, injuries, spills, and near misses?	Yes ☒	No ☐
11)	Does your company have a case management program?	Yes ☒	No ☐
12)	Does your company verify that subcontractors meet or exceed your HSSE and training requirements?	Yes ☒	No ☐

13)	Does your company have an Emergency Response Plan to address an emergency event?	Yes ☒	No ☐
14)	Does your company have a process to effectively manage preventive maintenance for equipment?	Yes ☒	No ☐
15)	Does your company conduct and document workplace and equipment inspections?	Yes ☒	No ☐
16)	Does your company have a written environmental program with a clearly written environmental policy endorsed by upper management?	Yes ☐	No ☒
17)	Does your environmental program include written procedures and assigned responsibilities to control:		
	Environmental Incident Reporting?	Yes ☒	No ☐
	Work related Environmental Impacts?	Yes ☒	No ☐
	Spill Prevention?	Yes ☒	No ☐
	Handling & Waste Disposal?	Yes ☒	No ☐
18)	Does your company have a HSSE records retention program?	Yes ☒	No ☐
19)	Does your company have a management of change process?	Yes ☒	No ☐
20)	Does your company have a documented New Employee Orientation?	Yes ☒	No ☐
21)	How does your company overcome inherent challenges to HSSE protection with respect to language barriers? ENVIRON is a global corporation & provides H&S programs in a variety of languages to meet employee needs.		

22)	What percentage of your work force falls under the following criteria for experience within your specific industry? Less than 6 months 0 % 6 months to 1 year 1-2 % 1 year to 5 years 10 % More than 5 years 85 %		
23)	Does your company provide a (behind the wheel driving the vehicle) driving instruction course? Can be provided at client request	Yes ☐	No ☒
24)	Does your company have a written fitness-for-duty program, which includes assessment of the physical capabilities of personnel to perform specific tasks?	Yes ☒	No ☐

HSSE Training

Please respond to **ALL** items with "Yes, No

Do not leave any items unanswered. **(Estimated Percentage of Employees should reflect the percentage of employees who will perform services for Remediation Management and are required by your company to have the training -- not the percentage of the total number of employees in your organization.):**

1) Does your company provide HSSE Training — Yes ☒ No ☐

Safety and Environmental Programs and Training	Type of instruction (School-certified, on-site instructor, safety meeting, video, on the job, etc.)	Estimated Percentage of Employees Receiving Training	Frequency of Training for Individual Employees (I-Initial, A-Annual, B-bi-annual, P-periodic)	Individual Employee Training Documented Yes / No
Defensive Driving/Vehicle safety	online	100%	P	Y
Hazard Recognition Training	on the job & online	100%	P	Y
Drug Awareness	online	100%	P	Y
Emergency Response	online & in person	100%	A	Y
Fire Extinguisher Training	NA	NA	NA	NA
First Aid/CPR	hands on	100%	B	Y
Hazard Communication (Employee Right to Know)	online	100%	P	Y
New Employee Orientation	in person	100%	I	Y
Personal Protective Equipment	online & on the job	100%	P	Y
Incident Reporting and Investigation	online & in person	100%	P	Y

2) Does your company maintain documentation that includes all HSSE regulatory required training and other HSSE training required by your company? Yes ☒ No ☐

3) Does your company maintain a training matrix that defines who will receive specific training courses and the intervals at which re-training is required? Yes ☒ No ☐

4) Does your company have a process to identify, which personnel are not current in their training? Yes ☒ No ☐

5) Does your company have a written plan for training personnel and subcontractors in required project specific requirements prior to commencing work on the project? Yes ☒ No ☐

Drug and Alcohol Program

1) Does your company have a written policy statement regarding drug/alcohol screening or testing of your employees? Yes ☒ No ☐
If, so, please provide a PDF electronic copy of the policy statement.

2) Does your company's drug/alcohol testing program conform to DOT requirements? as required by the client Yes ☒ No ☐
If Yes, which DOT regulation is your testing program designed to satisfy?
as required by the client

Federal Aviation Administration ____

Federal Railroad Administration ____

Federal Highway Administration ____

United States Coast Guard ____

Research and Special Projects Administration/Pipeline ____

3) Check the circumstances in which your company's employees may be subject to drug/alcohol screening.

Employment (pre-hire) ☐ Probable Cause ☐ Periodic ☐

Random ☐ Post Accident ☐ Other ☒ client specific request

4) Check the frequency of random drug testing that is performed of employees per year.

None ☐ 10% ☒ 25% ☐ 50% ☐ 100% ☐ Other: ☐

5) Circle the frequency of random alcohol testing that is performed of employees per year.

None ☐ 10% ☒ 25% ☐ 50% ☐ 100% ☐ Other: ☐

6) Does your company conduct medical physicals for:

Pre-employment ☒ Pulmonary Function ☒ Respiratory Protection ☒

V

CERTIFICATION OF DATA
BY CONTRACTOR MANAGEMENT

The questionnaire was completed by: Kristen Heitman and the facts as stated are true and correct.
(please print)

Position with Company H&S Representative

Phone # 312-288-3824

Signature: [signature] Date: 12/16/13

ENVIRON
Health & Safety
Standard Practice Instructions

Date:
January 2012

CONTENTS

February 13, 2013

ENVIRON Holdings, Inc.
Mr. Mark Watka
Director of Health & Safety
333 West Wacker Drive, 27th Floor
Chicago, IL 60606

RE: Workers' Compensation
Experience Modification History - NCCI

Dear Mark:

Following is ENVIRON's Experience Modification Rating (EMR) as promulgated by the National Council of Compensation Insurance (NCCI) for the past 3 years:

Effective:	EMR:
01/31/2013	0.74
01/31/2012	1.00
01/31/2011	0.98

Should you have any questions, please feel free to contact me directly.

Sincerely,

Ramy Morcos

Ramy Morcos, CRIS
Account Executive
Aon – Construction Services Group

Aon Risk Insurance Services West, Inc. | Construction Services Group
707 Wilshire Boulevard | Suite 2600 | Los Angeles | CA 90017
t +1.213.630.3200 | f +1.847.953.4529 | aon.com
License No. 0530733

OSHA's Form 300A (Rev. 01/2004)
Summary of Work-Related Injuries and Illnesses

Year 2010

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	2	1	1
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
4	6
(K)	(L)

Injury and Illness Types

Total number of...	(M)		(M)
(1) Injury	4	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Establishment information

Your establishment name: ENVIRON International Corporation

Street: 4350 North Fairfax Drive, Suite 300

City: Arlington State: Virginia Zip: 22203

Industry description (e.g., Manufacture of motor truck trailers)
Environmental Consulting Company

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)
____ ____ ____ ____

OR North American Industrial Classification (NAICS), if known (e.g., 336212)
5 4 1 6 2 0

Employment information

Annual average number of employees: 788

Total hours worked by all employees last year: 1,629,152

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Tracey Finn — Company executive

Director of Human R — Title

703-516-2474 — Phone

1-31-2011 — Date

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 2011

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	1	1	4
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
7	4
(K)	(L)

Injury and Illness Types

Total number of...	(M)		
(1) Injury	6	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Establishment Information

Your establishment name ENVIRON International Corporation

Street 4350 North Fairfax Drive, Suite 300

City Arlington State Virginia Zip 22203

Industry description (e.g., Manufacture of motor truck trailers)
Environmental, Health, & Safety Consulting

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)
8 7 4 8

OR North American Industrial Classification (NAICS), if known (e.g., 336212)
5 4 1 6 2 0

Employment Information

Annual average number of employees 782

Total hours worked by all employees last year 1,663,258

THE AMERICAN BOARD OF INDUSTRIAL HYGIENE
INCORPORATED
CERTIFICATION NUMBER
8857 CP
EXPIRES
6-1-2015
PENNSYLVANIA - 1960
MARK S. WATKA, CIH

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this documant and that to the best of my knowledge the entries are true, accurate, and complete.

Mark Watka, CIH
Company executive

Director of H&S
Title

312-288-3875
Phone

1/27/2012
Date

OSHA's Form 300A (Rev. 01/2004)
Summary of Work-Related Injuries and Illnesses

Year 2012

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	2	0	5
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
19	0
(K)	(L)

Injury and Illness Types

Total number of... (M)			
(1) Injury	5	(4) Poisoning	0
(2) Skin Disorder	1	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	1

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Establishment information

Your establishment name: ENVIRON International Corporation

Street: 4350 N Fairfax Drive, Suite 300

City: Arlington State: VA Zip: 22003

Industry description (e.g., Manufacture of motor truck trailers)
Environmental Consulting

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)
8748

OR North American Industrial Classification (NAICS), if known (e.g., 336212)
541620

Employment information

Annual average number of employees: 977

Total hours worked by all employees last year: 1,786,699

Sign here

Knowingly falsifying this document may result in a fine.

THE AMERICAN BOARD OF INDUSTRIAL HYGIENE
INCORPORATED
CERTIFICATION NUMBER
8857 CP
EXPIRES
6-1-2015
PENNSYLVANIA - 1960
MARK S. WATKA, CIH

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Mark Watka, CIH
Company executive

Director of H & S
Title

1-312-288-3875
Phone

1/31/2012
Date

Appendix D

American Technologies, Inc.

American Technologies, Inc. (hereafter referred to as "ATI") is a privately owned corporation and the individual, Mr. Gary Moore, who founded the business in 1989 is still at its helm today as its President and owner. Under his leadership, our company has experienced an annual growth rate of over thirty (30) percent. Since 2007, the company has been spotlighted by Inc. Magazine on an annual basis as one of the 5,000 Fastest-Growing Private Companies in America. During the same time, Engineering News Records has included ATI in its Top 600 Specialty Contractors list. Likewise, during this period, ATI has been recognized as one of the Top 10 Abatement Contractors for this region and The President of our organization, Gary Moore, has received a nomination as Entrepreneur of the Year from Ernst & Young.

With more than 24 years of experience, ATI is recognized as a leader in environmental remediation services and provides comprehensive services throughout the United States. We offer vast labor pools, experienced project managers, a hands-on management team and the latest technology and equipment. With the ATI advantage, you can depend on ATI's restoration and environmental experts 24 hours a day, 7 days a week. We have 15 regional offices that are centrally located in major metropolitan areas and bring to each job more than 24 years of experience with commercial, medical, industrial, public and educational institutions. At ATI we never lose sight of the human aspect of disasters large and small. We know the devastating effect building emergencies have on the people involved and our staff is trained to respond. ATI clients receive personal attention from our management team, plus all the benefits of a large company with nationwide locations, state-of-the art equipment and extensive personnel. Clients look to ATI to get back in operation fast. We respond immediately with emergency services and environmental remediation. We expertly restore buildings and recover contents. And we plan and manage all types of restoration projects. In short, ATI meets all of our client's restoration, environmental and reconstruction needs. This is precisely why we have been meeting challenges and exceeding expectations.

ATI annually completes in excess of 10,000 projects and specializes in all size of projects, from the very small to the very large regardless of project duration. ATI has been a pioneer in the environmental remediation industry and is on the cutting edge in regards to fire and water damage restoration. We have rendered services on projects ranging in price from $1,000 to $10 million since 1989. Our peers recognize us as one of the most outstanding firms dealing in biohazard remediation. We are constantly on the alert for better remediation technologies that will minimize costs to our clients, yet assure 100 percent compliance with all local, state and federal regulations.

Since 1989, we have served customers from a wide array of industries including:

- City/county municipalities
- Commercial properties
- Financial institutions
- General contractors
- Government agencies

- Healthcare institutions
- Hospitality and Resort industries
- Industrial properties
- Military installations
- Residential properties
- Retail outlets
- School/universities

ATI's greatest strengths are that we are full-service restoration, environmental and reconstruction experts. Major corporations, insurance carriers, adjusting firms and government agencies rely on ATI. Business owners and risk managers place their trust in us. We are prepared. We are experienced. We treat all people, including our customers, staff, vendors and industry peers, with dignity, remembering that behind every job is a human story that deserves our understanding and respect. In addition, acting with a sense of integrity in everything we do is our top priority. This means adhering to a standard of behavior that is based on excellence, honesty and fairness. From the top down, we believe that everyone at ATI must be accountable for the commitments we make and the actions we take. Further, as a company we believe if you don't love what you do, it will show in your work. That is why we value a sense of passion and pride of workmanship exhibited by every employee, on every job. We are renowned for rigorous project management and knowledgeable professionals who are based at ATI. With more than 20 years of experience, ATI is a national leader in restoration, environmental remediation and reconstruction.

ATI's teams which are comprised of technical experts are available 24 hours a day, 7 days a week, and 365 days a year. Our quick response can halt further damage to contents, systems and building materials and save valuable recovery time. We'll do whatever it takes to get businesses back in operation fast. We'll work after hours and on weekends if necessary. With ample equipment and labor, ATI can respond swiftly to a client's needs. Our customer service teams at each office are readily available to assist a client with any questions that may arise. The number of individuals varies at each office dependent upon the number of clients that the office services; however, based upon ATI's customer service philosophy each individual who works for the company, regardless of classification, is ready and available to assist at any time with a moment's notice.

Our mission, values and vision have been created based upon our core beliefs: possessing an integrity in our business dealings; mutual respect; accountability; passion and innovation and each is readily apparent in every interaction that any of our employees have with our customers. Our customers are the reason we are in business and we don't ever forget that. We are customer focused and demonstrate this on each project and with each client that we interact with day in and day out. It is precisely through our commitment to customer service that our business has grown exponentially.

We value our clients, the passion that individuals place in their work product and employ individuals who mirror our philosophy. Each year, we complete in excess of 10,000 projects and we are committed to each project being completed the ATI trademark way: with quality and true pride in craftsmanship. Communication is key to ATI's project model and we continually strive to ensure that we are meeting the client's expectations by following up with him/her at each step in the process. Due to our process our elite project teams receive constant and direct communication from the client on a daily basis to ensure that we are exceeding the client's expectations and meeting his/her challenges.

Unlike other organizations that specialize in only one aspect of the restoration or remediation industry, ATI specializes in and is technically knowledgeable and skilled in each of the services that we offer. In this capacity; we offer the following services to meet those specified within the RFQ, regardless of project size:

- **24/7 availability** – Round the clock availability.

- **Environmental stabilization** –Our emergency response teams are professionally trained to contain damaged areas and handle hazardous material issues including chemical spills, asbestos disturbance and microbial contamination.

- **Waste removal and disposal** – We use specially engineered controls including air filtration devices, decontamination units and HEPA –equipped tools to remove hazardous materials and control debris. Our environmental experts follow strict protocols that comply with local, state and federal regulations to characterize, transport and properly dispose of hazardous materials.

- **Hazardous material remediation** – Asbestos, lead, mold/mildew, microbial contaminants, household/light chemicals, industrial chemicals/waste and sewage.

- **Decontamination** – We use state-of-the art cleaning equipment and techniques to decontaminate exposed surfaces. These may include HEPA-vacuums, negative air machines, dehumidifiers, specially formulated disinfectant solutions and encapsulating sealants. Our environmental experts follow strict protocols that comply with local, state and federal regulations on every decontamination job.

Emergency Services:
The first hours and days are critical after any disaster. The first order of business: contact ATI. We respond 24 hours a day, 7 days a week and immediately dispatch technical experts to provide emergency repairs – and check for damage not readily visible. Our quick response can halt further damage to contents, systems, and building materials and save valuable recovery time.

We'll do whatever it takes – including setting up temporary power – to get businesses back in operation fast. We'll work after hours and on weekends if necessary.

Our professionals will first stabilize the building by securing the site, investigating structural issues, making interim repairs, removing materials beyond saving , installing temporary roofing, extracting water and mitigating damage to equipment and building contents. We also check for environmental problems that can result from disaster, including the potential for mold and the new presence of asbestos and lead. All before launching a full recovery plan. We're experienced with building emergencies of every type. ATI is prepared. Are you?

The full-service emergency response that ATI brings to its clientele are 24-hour response, smoke and soot decontamination, on-location dry down, water extraction, building dehumidification, specialty drying, temporary repairs and shoring, roof tarps and board up, emergency power, electronics and document recovery, environmental remediation and biohazard clean-up.

Environmental and Hazardous Materials Cleanup:
Team with America's leading authority in asbestos and lead abatement. We've completed more lead removal projects than any other disaster recovery company in the western United States and Engineering News-Record continuously recognizes ATI as one of the Top 10 specialty abatement contractors in the country.

ATI began as an environmental services company, and our safety record is second to none. Clients hire use for abatement at commercial properties because we offer years of expertise, exacting protocols, engineering controls and a large pool of certified professionals. We have full-time safety personnel and technicians rigorously trained in asbestos and lead abatement regulations and procedures.

Building emergencies, renovations and demolition can cause the release of dangerous asbestos fibers and lead fragments and dust, requiring comprehensive abatement planning. ATI has the ability to arrange for an independent industrial hygienist firm to test before and after abatement, as required. We notify national, state and local environmental oversight agencies of our work and maintain good standing with certification bodies. Our demanding safety controls also include the use of containments with negative air, critical barriers and decontamination chambers, NIOSH/MSHA-approved respirators and personnel protective equipment. All ATI employees must pass current medical surveillance and the highest level of training related to asbestos and lead abatement equipment and safety. And ATI's long-term work for major insurance companies ensures that our costs are in line with industry standards.

Team with ATI, America's leading authority in asbestos and lead abatement.

Some of the projects on which we have rendered these services are as follows:

- **Arsenic Containment –** North Carolina

Fire erupted within a Class 100 Cleanroom of R.F. Micro-Devices, a major semiconductor manufacturer. The sprinklers contained the fire within a 1,200 square foot cleanroom of the 200,000 square feet Fabrication Area (FAB). The entire cleanroom and the $1 million FAB tool were not only contaminated with smoke and water, but also arsenic. Laboratory results showed that the levels of arsenic exceeded 20,000 mg/ft^2.

American Technologies, Inc. was called into the loss, to evaluate the methodology and cleaning method being used by a local hazardous material company, and to reduce the risk to the client and the insurance companies.

American Technologies, Inc. spearheaded the cleaning and re-certification of the Class 100 cleanroom and disposal of all hazardous waste. American Technologies, Inc. immediately initiated the protocols for entering the room and created a series of decon staging chambers to mitigate the spread of contamination. Once this was established, American Technologies, Inc. commenced the cleaning and re-certification of the room and proper disposal of all hazardous material, bringing the client back into business in the most expeditious timeframe.

The electronic industry has standard cleaning criteria of 100-ug/100 cm^2 and the insured chose 12-ug/100-cm^2 for final clean up standard to which American Technologies, Inc. achieved.

- **Demolition and Environmental Remediation –** California

An early morning fire broke out in the cafeteria of a high school campus, resulting in a total loss of the 40,000 square foot structure. The day after the fire, ATI's representatives walked the loss site with school officials and we were assigned the job of demolition and environmental remediation on the spot.

Within hours after receiving the job, a large crew of ATI personal arrived on-site to begin work. Demolition and environmental remediation services includes: asbestos abatement, lead abatement and polychlorinated biphenyl (PCB) decontamination and disposal.

Although this demolition job posed dangerous environmental challenges, ATI possessed the experience, certifications, resources and skill level required for a safe and successful recovery including:

- Solid credentials in comprehensive hazardous materials mitigation with nearly 25 years of environmental remediation experience.
- A full service Environmental Division, ensuring that asbestos abatement, lead removal and PCB decontamination could all be completed by a single recovery team, saving the school valuable time and money hiring other services for these specialized jobs.
- Environmental Protection Agency (EPA) and the Division of Occupational Safety and Health (OSHA) certifications.
- Full-time staff including management and technicians professionally trained and IICRC-certified in asbestos, lead and hazardous waste remediation.
- In-depth knowledge of criteria and protocols set forth by the South Coast Air Quality Management District (AQMD) and CAL/OSHA.

Environmental remediation is always challenging and this job was no different. For this loss, the ATI recovery team had to contend with three difficult and potentially dangerous situations: asbestos disturbance, the presence of lead and PCB contamination. But as a leader in comprehensive hazardous materials mitigation, the team assigned to this loss arrived on-site with the depth of knowledge, skill and industry credentials to safely separate, remove and dispose of the hazardous waste in accordance with AWMD and CAL/OSHA criteria.

No matter the challenges presented in a loss, ATI Recovery teams always look for ways to go the extra mile for the client. In addition to the difficult environmental work, the ATI crew was able to collect and recycle metal materials from the job site. All of the money earned by recycling the building materials was given to the client.

Despite the environmental challenges, this dangerous demolition job was safely completed with no accidents, within the school's one-month time frame and nearly $60,000 under budget.

- **Public High School** – Glendale, California

Vandals set fire to a Physics Classroom at Hoover High School in Glendale, California. The fire and smoke damage caused more than $1,500,000 in remediation and restoration.

Although no one was injured in the fire, environmental precautions were quickly assessed. Since the structure was a public school, an Asbestos Management Plan was already in place indicating areas of asbestos disturbance. The areas that required asbestos abatement occurred on the third floor to fireproofing material located on the structural steel and corrugated metal deck.

Emergency notification was made to SCAQMD. Affected areas were isolated and ATI completed work while classes were being conducted on the floors below.

Asbestos abatement procedures were in compliance with all EPA, OSHA, NIOSH and SCAQMD regulations. Final monitoring and clearance was conducted by a third party environmental consulting firm.

Contents were packed out and taken to the ATI facility for decontamination and cleaning in our ozone chamber to remove heavy smoke odor.

ATI completed its portion of the asbestos abatement and fire restoration ahead of schedule without disruption to classroom activities in the adjacent occupied areas.

LICENSURE:

American Technologies, Inc. holds the following licensure which is relevant to the services delineated in the RFQ:

LICENSE IDENTITY	***NAME OF PUBLIC ENTITY***	***LICENSE NO.***	***ISSUANCE DATE***	***EXPIRATION DATE***
Certification of Registration for Asbestos Work	State of California Dept. of Industrial Relations DOSH	213	07/06/98	07/05/14
Hazardous Materials License	California Highway Patrol	139972	09/09/11	09/30/14
Hazardous Waste Transporter Registration (**Bay Area, Orange, Sacramento and San Diego offices only**)	Department of Toxic Substance Cal/EPA	3272	03/19/98	04/30/14
Contractor's License **(Asb, B, Haz, C6, C15, C21, C39, C47)** (C6, C21, C39 QI: Jeff Moore) (C15 QI: Ryan Moore)	State of California Contractors State License Board	571784	06/27/89	06/30/15

Linda S. Adams
Secretary for
Environmental Protection

Department of Toxic Substances Control

Deborah O. Raphel, Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Edmund G. Brown Jr.
Governor

HAZARDOUS WASTE TRANSPORTER REGISTRATION

NAME AND ADDRESS OF REGISTERED TRANSPORTER:

AMERICAN TECHNOLOGIES, INC.
210 BAYWOOD AVENUE
ORANGE, CA 92865

TRANSPORTER REGISTRATION NO.: 3272

EXPIRATION DATE: APRIL 30, 2014

THIS IS TO CERTIFY THAT THE FIRM NAMED ABOVE IS DULY REGISTERED TO TRANSPORT HAZARDOUS WASTE IN THE STATE OF CALIFORNIA IN ACCORDANCE WITH THE PROVISIONS OF CHAPTER 6.5, DIVISION 20 OF THE HEALTH AND SAFETY CODE AND TITLE 22 OF THE CALIFORNIA CODE OF REGULATIONS, DIVISION 4.5.

THIS REGISTRATION CERTIFICATE MUST BE CARRIED WITH EACH SHIPMENT OF HAZARDOUS WASTE.

FOR REGISTRATION INFORMATION, PLEASE CALL (916) 440-7145.

Lori L. Patterson
(AUTHORIZED SIGNATURE)

APR 30 2013
(DATE)

State Of California

Consumer Affairs

CONTRACTORS STATE LICENSE BOARD

ACTIVE LICENSE

License Number **571784** Entity CORP

Business Name AMERICAN TECHNOLOGIES INC

Classifications(s) ASB B HAZ C47 C21 C39 C-6 C15

Expiration Date 06/30/2015 www.cslb.ca.gov

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

Certificate of Registration for Asbestos-related Work

Certificate No. 213

Expiration Date 05-Jul-14

AMERICAN TECHNOLOGIES, INC.

(Name of Employer)

is duly registered by the Division of Occupational Safety and Health in accordance with the California Administrative Code, Title 8, Article 2.5 for asbestos-related work.

17-May-13
Date Of Issuance

Division of Occupational Safety and Health

Effective Date 06-Jul-13

Contractor's License No. 571784

This registration is valid only when the following requirements and conditions are met:

1. The registered employer shall safely perform asbestos-related work in compliance with relevant occupational safety and health regulations.
2. The registered employer shall notify the Division of changes in work locations or conditions as specified by Section 341.9 of Title 8 of the California Administrative Code.
3. The registered employer shall post a sign readable at 20 feet at the location of any asbestos-related work stating:

   Danger-Asbestos
   Cancer and Lung Hazard
   Authorized Personnel Only

4. A copy of the registration shall be posted at the jobsite beside the Cal-OSHA poster.
5. The registered employer shall provide a copy of this registration certificate to the prime contractor and any other employers at the site before the commencement of any asbestos-related work.
6. The registered employer shall conduct a safety conference prior to the commencement of any asbestos-related work as specified by Section 341.11 of Title 8 of the California Adminstrative Code.
7. The registered employer acknowledges the Division's right to revoke or suspend this registration as provided by Section 341.14 of title 8 of the California Administrative Code.

Appendix E

Business Terms and Conditions

GENERAL TERMS AND CONDITIONS

ENVIRON International Corporation, a Virginia corporation, ("ENVIRON") agrees to provide professional services under the following General Terms and Conditions:

1. Fees: ENVIRON bills for its services on a time and materials basis using standard hourly rates. If requested, we will provide an estimate of the fees for a particular task, and we will not exceed that estimate without prior Client approval. For deposition and testimony we charge premium hourly rates. In certain circumstances we will undertake an assignment on a fixed fee basis if the requirements can be clearly defined.

2. Invoicing: ENVIRON bills its clients on a monthly basis using a standard invoice format. This format provides for a description of work performed and a summary of professional fees, expenses, and communication and reproduction charges. For more detailed invoicing requests, ENVIRON reserves the right to charge for invoice preparation time by staff members.

3. Payment: ENVIRON bills are payable UPON RECEIPT. We reserve the right to assess a late charge of 1.5 percent per month for any amounts not paid within 30 days of the billing date. We also reserve the right to stop work or withhold work product if invoices remain unpaid for more than 60 days past the billing date. If our work relates to a business transaction, we expect to be paid in a timely fashion, without regard to whether or when the transaction closes. If we are required to take legal action to have our invoices paid and we win in court, Client agrees to pay our costs, including reasonable legal fees.

4. Subcontractors: ENVIRON has a policy that its Clients should directly retain other contractors whose services are required in connection with field services for a project (e.g., drillers, analytical laboratories, transporters). As a service to you, we will advise you with respect to selecting other such contractors and will assist you in coordinating and monitoring their performance. In no event will we assume any liability or responsibility for the work performed by other contractors you may hire. When ENVIRON engages a subcontractor on behalf of the Client, the expenses incurred, including rental of special equipment necessary for the work, will be billed as they are incurred, at cost plus 15 percent. By engaging us to perform these services, you agree to indemnify, defend and hold ENVIRON, its directors, officers, employees, and other agents harmless from and against any claims, demands, judgment, obligations, liabilities and costs (including reasonable attorneys' and expert fees) relating in any way to the performance or non-performance of work by another contractor, except claims for personal injury or property damage to the extent caused by the negligence or willful misconduct of ENVIRON's employees.

5. Reimbursable Expenses: Project-related expenses including travel, priority mail, and overnight delivery, outside reproduction and courier services will be billed at cost plus 15 percent. The use of company-owned cars, trucks, and vans will be charged at $125 per day. The use of company-owned equipment and protective clothing will be billed in accordance with our standard fee schedule. The cost of project-related communications, to include in-house telephone, facsimile, postage, and reproduction, computers, data compilation, and CADD will be charged at a total of 6 percent of the total labor charges.

6. Access and Information: Client agrees to grant or obtain for ENVIRON reasonable access to any sites to be investigated as part of ENVIRON's scope of work. Client also agrees to indicate to ENVIRON the boundary lines of the site and the location of any underground structures, including tanks, piping, water, telephone, electric, gas, sewer, and other utility lines. Client agrees to notify ENVIRON of any hazardous site conditions or hazardous materials, about which Client has knowledge and to which ENVIRON's employees or contractors may be

exposed while performing services on behalf of Client, including providing copies of relevant Material Safety Data Sheets. Client also shall make available to ENVIRON all information within its control necessary to allow ENVIRON to perform its services and agrees to comply with reasonable requests by ENVIRON for clarification or additional information. Client shall be responsible for the accuracy of this information. ENVIRON shall not be responsible for any damage to underground structures or utilities to the extent such damage was caused by incomplete or inaccurate information provided to us by the client or other party. Client agrees to make ENVIRON aware of any unsafe conditions at any project site about which Client has knowledge.

7. Reporting Requirements: Client may be required under federal, state or local statutes or regulations to report the results of ENVIRON's services to appropriate regulatory agencies. ENVIRON is not responsible for advising Client about its reporting obligations and Client agrees that it shall be responsible for all reporting, unless ENVIRON has an independent duty to report under applicable law. In those situations, ENVIRON will provide Client with advance notice that ENVIRON believes that it has an obligation to report as well as the substance of the report it intends to make.

8. RCRA Compliance: Client shall be responsible for complying with the Resource Conservation and Recovery Act, 42 U.S.C. Section 6901 et. seq. ("RCRA") and its implementing regulations in connection with ENVIRON's work under this Agreement. Client may request ENVIRON's assistance in meeting its RCRA and other similar waste management obligations, including analytical testing to assist Client in proper characterization of waste, identifying potential transporters and disposal facilities for waste (provided that Client shall make the final selection of both the transporter and disposal facility), entering into subcontracts or purchase order arrangements with the transporters and/or disposal facilities selected by Client, and preparing manifests for the Client's approval and execution. Client agrees that, by virtue of providing these services, ENVIRON shall not be deemed a "generator" or a party who "arranges" for the "transportation," "treatment" or "disposal" of any "hazardous waste" or "hazardous substance" (as those terms are defined in the Comprehensive Environmental Response Compensation and Liability Act or "CERCLA", 42 U.S.C. Section 9601). Client agrees to indemnify, defend and hold ENVIRON, its directors, officers, employees and agents, harmless from and against any and all claims, demands, judgments, obligations, liabilities, any costs (including reasonable attorneys' and expert fees) relating to: (1) ENVIRON'S work in assisting Client with its RCRA obligations; and (2) the transportation, treatment, and disposal of hazardous substances or hazardous waste generated by the field activities conducted for Client.

9. Confidentiality: We treat all information obtained from Clients as confidential, unless such information is previously known to us, comes into the public domain through no fault of ours, or is furnished to us by a third party who is under no obligation to keep the information confidential. If we are subpoenaed to disclose confidential information obtained from you or about our work for you, we will give you reasonable notice and the opportunity to object before releasing any confidential information.

10. Independent Contractor: Client agrees that ENVIRON is acting as an independent contractor and shall retain responsibility for and control over the means for performing its services. Nothing in these Terms and Conditions shall be construed to make ENVIRON or any of its officers, employees or agents, an employee or agent of Client.

11. Standard of Care: In performing services, we agree to exercise professional judgment, made on the basis of the information available to us, and to use the same degree of care and skill ordinarily exercised in similar circumstances by reputable consultants performing comparable services in the same geographic area. This standard of care shall be judged as of the time the services are rendered, and not according to later standards. ENVIRON makes no other warranty or representation, either express or implied, with respect to its services. Estimates of cost, recommendations and opinions are made on the basis of our experience and professional judgment; they are not guarantees. Reasonable people may disagree on matters involving professional judgment and, accordingly, a difference of opinion on a question of professional judgment shall not excuse a Client from paying for services rendered.

Client recognizes that there may be hazardous conditions at sites to be investigated as part of ENVIRON's work. Client acknowledges that ENVIRON has neither created nor contributed to the existence of any hazardous, toxic or otherwise dangerous substance or condition at the site(s) which are covered by ENVIRON's work. Client also recognizes that some investigative procedures may carry the risk of release or dispersal of pre-existing contamination, even when exercising due care. Client releases ENVIRON from any claim (including claims under CERCLA or state law) that it is an "operator" of any site where it performs work for Client or a "generator" or a party who "arranges" for the "transportation," "treatment" or "disposal" of any "hazardous substance" (as those terms are defined in CERCLA), by virtue of its work for Client at any site.

12. Insurance: ENVIRON shall maintain the following insurance coverage while it performs the work described in Exhibit "A:" (1) statutory Workers Compensation and Employer's Liability Coverage; (2) General Liability for bodily injury and property damage of $1,000,000 aggregate; (3) Automobile Liability with $1,000,000 combined single limit; and (4) Professional Liability and Contractor's Pollution Liability with a combined single limit of $1,000,000 per claim and in the aggregate. If Client desires additional insurance or special endorsements, premiums associated with that coverage would be considered a reimbursable expense. Upon request, we will provide you with a certificate of insurance.

13. Third Parties: ENVIRON's services are solely for Client's benefit and may not be relied upon by any third party without ENVIRON's express written consent. Any use or dissemination of ENVIRON work products (including ENVIRON reports), without the written consent of ENVIRON, shall be at Client's risk and Client shall indemnify and defend ENVIRON from any and all claims, demands, judgments, liabilities and costs (including reasonable attorneys' and expert fees), related to the unauthorized use or dissemination of ENVIRON's work. Client also agrees to be solely responsible for and to defend, indemnify, and hold ENVIRON harmless from and against any and all claims, demands, judgments, liabilities and costs (including reasonable attorneys' and expert fees), asserted by third parties arising out of or in any way related to our performance or non-performance of services, except for claims of personal injury or property damage to the extent caused by the negligence or willful misconduct of ENVIRON's employees.

14. Limitation of Liability: ENVIRON shall be liable only for direct damages that result from ENVIRON's negligence or willful misconduct in the performance of its services. UNDER NO CIRCUMSTANCES SHALL ENVIRON BE LIABLE FOR INDIRECT, CONSEQUENTIAL, SPECIAL, OR PUNITIVE DAMAGES, OR FOR DAMAGES CAUSED BY THE CLIENT'S FAILURE TO PERFORM ITS OBLIGATIONS UNDER LAW OR CONTRACT. ENVIRON shall not be liable for and Client shall indemnify ENVIRON from and against all claims, demands, liabilities and costs (including attorneys' and expert fees) arising out of or in any way related to our performance or non-performance of services, including all on-site activities except to the extent caused by ENVIRON's negligence or willful misconduct. In no event shall our liability

exceed $1,000,000 (net of reimbursable expenses) and Client specifically releases ENVIRON for any damages, claims, liabilities and costs in excess of that amount.

15. Termination: This Agreement may be terminated by either party upon ten (10) days written notice to the other. If Client terminates the Agreement, Client agrees to pay ENVIRON for all services performed until the effective date of the termination. Client's obligations under Paragraphs 3, 4, 8, 9, 11, 13, and 14 shall survive termination of this Agreement and/or completion of the services hereunder.

16. Disputes: All disputes under this Agreement shall be resolved by binding arbitration under the rules of the American Arbitration Association. If our personnel or documents are subpoenaed for depositions or court appearance in any dispute related to the project (except disputes between ENVIRON and Client related to our services), Client agrees to reimburse us at our then current billing rates for responding to those subpoenas, including out-of-pocket reimbursable expenses.

17. Scope of Agreement: Once Client has signed ENVIRON's proposal, that proposal and these Terms and Conditions shall constitute the complete and exclusive Agreement between the parties and will supersede all prior or contemporaneous agreements, whether written or oral. No provision of these Terms and Conditions may be waived, altered or modified except in writing and signed by ENVIRON. Client may use standard business forms, such as purchase orders, for convenience only; any provision on those forms that conflict with these Terms and Conditions shall not apply.

18. Nonsolicitation: Both ENVIRON and Client agree during the term of this Agreement and for 12 months following its termination for any reason, neither party will solicit for employment, or hire as an employee or contractor, any personnel of the other party involved in the performance of services to the Company.

REVISION – May 2011

Appendix F

Estimated Project Schedule

Estimated Project Schedule
SMMUSD
Santa Monica, California

Task	January			February				March				April				May					June			
	1/16/14	Week 1	Week 2	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 5	Week 1	Week 2	Week 3	Week 4
Contract Execution	X																							
Initial Abatement																								
- Specifications																								
- Abatement																								
- Clearance Testing		X	X	X	X	X																		
Indoor Air Testing																								
- Sampling program design																								
- Implementation																								
- Laboratory and data analyses																								
- Written report																								
- Presentation and agency interaction				X	X	X	X	X	X	X	X	X	X											
Best Practices Program						X	X	X	X															
Site Investigation and Abatement																								
- Work plan development																								
- Investigation																								
- Health risk assessment																								
- Abatement / remediation		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Community Outreach Activities (as required)																								
Meetings (as required)																								
Progress Reports							X				X				X					X				X