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December 20, 2013

Ms. Janece L. Maez
Associate Superintendent
Business and Fiscal Services
Santa Monica-Malibu Unified School District
1651 16th Street
Santa Monica, CA 90404

Subject: Exponent Qualifications to Provide Services Related to Environmental Concerns at District Facilities

Dear Ms. Maez:

Exponent is pleased to submit this Statement of Qualifications describing the high level of skills and many years of experience we offer the Santa Monica-Malibu Unified School District (the District) evaluating and managing chemicals in soil and indoor environments. As described below, we offer you the technical skills needed, and we have a great deal of experience working with the regulatory agencies responsible for oversight of your current efforts. In addition, we are experienced in risk communication and have worked on many projects that have a high level of community concern.

A. Understanding of Problem

We have reviewed the Request for Qualifications (RfQ), the materials that accompanied the RfQ, as well as the sampling results and other materials posted on the District's website. We have also read many of the news reports and video postings in which concerns about environmental conditions at the Malibu High School were discussed. As is illustrated in more detail in the text below, Exponent offers the District a high level of technical expertise in the scientific areas associated with the three technical tasks described in the RfQ. We also offer the District literally decades of experience with successful project completions involving the DTSC and USEPA Region 9 in site investigation and site management. We appreciate the high level of concern in the school community, and we understand that a particularly high level of clarity, transparency, and credibility is required for the success of this project. We are in a unique position to provide the support the District needs at this time.

B. Statement of Qualifications

The people we have identified to work on this project have been selected because they offer the SMMUSD a high level of technical skills and a long history of experience and successful site investigation and management experience specifically with PCBs and multi-media sites that have been investigated and managed under the supervision of the DTSC (see Attachment A for resumes). Dr. Scofield, Ms. Caviness, Ms. Kalmes and Mr. Reyhani each have decades of experience working with the DTSC. Some of the housing subdivisions for which we have provided environmental management service, for example, included transfers of parts of the subdivision to school districts, requiring working directly with the Schools division of DTSC. Many of the DTSC guidance documents written within the last several years were applied to sites other than school sites, and we have worked with those procedures on many other non-school sites. Dr. Scofield recently helped the administrators of a high school in Santa Monica address chemical exposure concerns expressed by a few parents and teachers. For the last few years, he has been working on a litigation matter involving alleged exposure to PCBs and is very familiar with the historical development of the State's approach to regulating and setting exposure limits for PCBs. He and Ms. Caviness worked for over 10 years on a large manufacturing site in California, where PCB was the primary chemical of concern. Dr. Scofield has worked on other sites in California where PCBs were detected and he worked under oversight from DTSC and Region 9 USEPA to successfully close the sites. Dr. Scofield and Ms. Kalmes have helped develop facility re-occupancy criteria for buildings following decontamination of PCB and other residues. An overview of Exponent and a summary of representative skill and experience offered by the company are provided in Attachment B.

Mr. Reyhani has supervised the investigation and remediation of well over 100 sites under DTSC supervision and is well known and highly regarded at the DTSC. A summary of Terra Pacific Group's qualifications is provided in Attachment C, along with a summary of their excellent safety record. Time did not allow collecting all of the statistics requested in the RfQ, but our team offers the SMMUSD the excellent safety records needed for their remediation contractors. Terra Pacific Group and Exponent also share the types of and levels of insurance required.

Representative descriptions of relevant service areas and projects and an overview of Exponent are provided in Attachment A.

C. Technical Approach

We understand three technical tasks are currently anticipated, although the specific scope of services or level of effort required for each task is not precisely defined at this time. As is often the case with site investigation and management projects such as this one, the specific scope and level of effort necessary will become evident over the course of the project. The goals and methods of each task will evolve as new information is developed, and if the

concerns of various stakeholders evolve, for example. As noted above, we understand the importance of monitoring the dynamic elements of projects like this to assure that the detailed approach for each new sampling activity, or risk management activity, is consistent with applicable agency guidance and professional practices, and is responsive to questions and concerns of the Santa-Monica-Malibu United School District (SMMUSD) community. We see Exponent's primary responsibility as being to synthesize both applicable guidance and the concerns of the school community to develop and implement sampling and risk management strategies that are technically sound, consistent with agency regulations and guidance, and responsive to the concerns of the SMMUSD community.

Our fundamental approach to each site investigation or risk management activity will begin by identifying applicable regulations and guidance. The applicable regulation and guidance generally leave room for professional judgment in the application of the guidance to specific physical conditions, or to address risk communication issues, for example. We would develop draft plans for site investigation or risk management, and submit this for review by the appropriate regulatory agencies and by SMMUSD management, who would provide the appropriate review. We would integrate comments and develop a final plan prior to implementing any action. We would also see that the sampling or risk management plan is implemented. We would evaluate health risks for any detected chemicals and would prepare any reports that need to be prepared for submission to agencies. We would be happy to provide support for any additional risk communication activities the District undertakes.

This approach would maximize efficiency and consistency as new locations in the District are addressed, yet would allow for the flexibility to address the different physical conditions that might be encountered.

The three tasks to be addressed include:

Indoor Air Quality. We understand air samples have been collected. We would review the results and methods used in the collection of these samples, along with any comments that agencies may offer. We would be happy to implement any future sampling that may be needed, or to work with the District's existing consultants to take advantage of their experience on the project. We could provide a quantitative health risk for the results that have been collected to date.

Best Practices for PCBs. We understand the U.S. EPA has made suggestions to the District about the application of what they refer to as a set of "Best Practices" to address short-term and long-term actions for evaluating and managing exposure to PCBs at school sites. Under this task, we would develop those general practices along with the similar guidance that the Department of Toxic Substances Control (DTSC) has developed into a more specific plan that could be implemented across the District, taking into account the physical and other relevant factors at the District (e.g., remodeling, maintenance or material purchasing information that might be uncovered). We would work closely with U.S. EPA

and DTSC to develop the plan, coordinate any appropriate oversight, and to make any appropriate documentation of progress and activities.

DTSC School Property Evaluation and PCB Abatement Program. The DTSC has a three-step process for evaluating school sites, and we would propose a systematic evaluation of the properties in the SMMUSD following the fundamental, tiered process developed by DTSC for the evaluation of school sites. The three steps of DTSC include: a) Phase I Site Assessment; b) Preliminary Environmental Assessment; and c) Response Action. Because of the nature of the school sites, it is probably not necessary to undertake a formal Phase I site assessment, as might be required for the acquisition of a new property, but a review of the history of the property, consideration of findings at other schools and other relevant factors would help identify properties, or parts of properties, that might warrant further investigation. Any further site investigation would be undertaken in conformance with applicable guidance from the DTSC. While DTSC guidance would be followed, investigations may be more focused than would be applied to evaluate a newly purchased school site, for example. Similarly, the third phase of the process, Response Action, may be focused on specific areas of a property that warranted some form of risk management (e.g., soil removal, exposure prevention, etc.).

These steps would be taken in close coordination with DTSC (and U.S. EPA if appropriate). Written reports summarizing initial (e.g. Phase I) findings, sampling plans, sampling results, evaluation of findings and plans for remedy would be submitted to the District for the review process, and would be submitted to the agencies for review and approval in accordance with DTSC guidance for school site evaluation.

D. Project Cost Management.

Because the scope of the entire project is not known at this time, we cannot provide a complete estimate of costs. We understand that an efficient approach is required and that costs need to be managed. The approach we have proposed is, in our experience, the most cost effective way to proceed with a program like this one; and we would provide cost estimates for each specific work activity in this project as it progresses and prior to performing each work activity. The hourly billing rates for Exponent are provided in Attachment B. The hourly billing rates for Terra Pacific Group are provided in Attachment A.

E. Project Team.

Exponent would be the primary firm on this contract and we anticipate working closely with Terra Pacific Group, who would be performing any environmental sampling and overseeing any remediation. The Principal in Charge of the Project would be Dr. Robert Scofield. The Project Manager would be Ms. Gwendoline Caviness. At this time, we anticipate that Ms. Caviness would be the primary contact for communication and coordination of the project at

Exponent. She would coordinate with Exponent staff, Terra Pacific Group, the District personnel, and any subcontractors or other advisors to the District. She would also provide the primary contact with agency representatives. Ms. Caviness offers the District many years of experience, a high level of skill, and a great deal of credibility and trust with the regulatory agencies serving in such a role at other sites with multiple chemicals, including PCBs. We have also included Ms. Renee Kalmes at Exponent as a technical advisor who may be called on to help with this project because of her experience as a Certified Industrial Hygienist and developing re-entry criteria for indoor environments where PCB remediation has been completed. Dr. Scofield would be actively involved in the direction of this project and would have overall responsibility for the technical direction, quality control, and the level of service on the project. He would participate in meetings and conference calls, as appropriate. Mr. Max Reyhani, of Terra Pacific Group, would coordinate the work at that firm. Mr. Reyhani offers the District decades of experience with investigation and remediation projects under DTSC oversight in southern California. We also understand that the District is currently working with technical consultants, and we would be happy to work with them with any division of responsibility that best satisfies the District's goals and the successful completion of the project.

We are very pleased to submit this summary of our team's qualifications and would be happy to answer any questions you may have.

Sincerely,

Robert Scofield, D.Env.,
Director of the Center for Exposure
Assessment and Dose Reconstruction

Attachments

1) Terra Pacific Letter of Intent
2) Exponent resumes
3) Exponent Corporate Overview

Appendices

A) Billing rates for Exponent and Terra Pacific Group

Attachment 1

TERRA PACIFIC GROUP
Environmental Engineering, Consulting, and Construction

13900 Alton Parkway, Suite 122, Irvine, California 92618
Phone (949) 297-4444 • Fax (949) 297-3625

December 19, 2013

Robert Scofield, D.Env
Exponent
475 14th Street, Suite 400
Oakland, CA 94612

RE: Qualifications for Services Related to Environmental Concerns at District Facilities
Santa Monica-Malibu School District

Dear Dr. Scofield:

Terra Pacific Group Incorporated (TPG) is pleased to provide this response to qualifications request for providing services to the Santa Monica-Malibu School District ("District"). TPG is a full-service environmental engineering, consulting and remedial construction company with extensive experience in investigation and remediation of environmental impacts. TPG and its specialized subcontractors have the experience and qualifications to provide all of the services requested by the District. The following summarizes TPG's key qualifications:

- TPG holds a California Contractor's License necessary to conduct any remediation work;
- TPG senior staff consist of numerous California-licensed professionals including Professional Engineers (PE/RCE), Professional Geologists (PG), and Certified Hydrogeologists (CHG);
- TPG and its subcontractors have extensive experience in the investigation of Sites with PCB impacts and other similar constituents;
- TPG has extensive experience in multi-media site investigation, removal and remediation activities under the oversight of the California Department of Toxic Substances Control (DTSC). TPG has worked on over 30 sites under DTSC oversight in the past 5 years and is currently active on more than a dozen investigation and remediation sites under DTSC;
- TPG carries all of the minimum insurance requirements stipulated by the District;
- TPG's health and safety track-record is exemplary and includes the following key statistics:
    - Zero recordable incidents in its history;
    - Zero number of days-away-from-work cases in the firm's history;
    - Zero number of days away from work;
    - Zero fatalities in its history;
    - Zero vehicle accidents in its history.
- TPG has never received any form of Notice of Violation (NOV) or Notice of Compliance (NOC) in its history;

- TPG maintains a robust and extensive Health, Security, Safety and Environmental (HSSE) program and training.

The TPG proposed schedule of charges are attached for your reference. TPG can provide additional information and details upon request and appreciates the opportunity to provide a summary of its qualifications for consideration in providing services to the District and working with Exponent.

Sincerely,

Terra Pacific Group Incorporated

Max Reyhani, PE
Principal

Attachment 2

Exponent
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Robert Scofield, D. Env., M.P.H.
Principal Scientist and Center Director

Professional Profile

Dr. Robert Scofield is a Principal Scientist and the Director of Exponent's Health Sciences Center for Exposure Assessment and Dose Reconstruction. Dr. Scofield has over 34 years of experience in performing human health risk assessments and exposure assessments for chemicals in the environment and consumer products.

He has managed or performed health risk over 500 human health risk assessments for chemicals in soil, water, and air. These evaluations have including major Superfund sites, RCRA Sites, agricultural chemical sites, Brownfield redevelopment sites, petroleum spill sites, manufactured gas plant sites, and other waste disposal or spill sites. He has also performed and reviewed multipathway risk assessments for diesel exhaust emissions, municipal and hazardous waste incinerators, and air emissions from industrial process stacks and research laboratories under a variety of State, Federal, and international regulatory programs and in support of risk communication. Dr. Scofield provided risk assessment support to a large gas utility as part of their program to address PCBs in condensates from their service system, and he is currently engaged in a project in which the evolving regulatory approach to evaluating health risks to PCBs is a central issue.

Dr. Scofield has been directly involved in the evaluation of health risks at over 40 manufactured gas plant sites and has developed methods for evaluating remediation goals and managing remediation risks at many additional gas plant sites. For a consortium of utilities in California, Dr. Scofield developed a risk assessment approach and software to be used to estimate human health risks from gas plant sites and to calculate risk based remediation goals. He also lead an effort to develop a data base and remediation decision methodology based on restoring gas plant sites to background levels of PAHs. This method is used in urban environments where background levels of PAHs in soil exceed health risk levels generally considered to be the upper end of the acceptable risk range, and the approach was adopted by the State of California for use at gas plant (and other PAH) sites in urban environments. For a major utility in Illinois, Dr. Scofield developed a methodology for prioritizing a portfolio of 60 gas plants based on potential health risks posed by the sites, and he led an effort to develop a risk-based approach to real-time air monitoring and vapor management. This approach was used during the remediation of gas plants with high levels of VOCs in soil and with populations in close proximity to the remediation activities.

He has performed or peer reviewed risk assessments conducted in many countries in Europe, Asia, and South America. In Australia, he has performed or reviewed more than 20 risk assessments for contaminated land and air toxics sites in New South Wales, Victoria, South Australia, and Western Australia. Dr. Scofield is an approved risk assessor by the New South Wales government for risk assessments performed under their Site Auditor program. He has

extensive experience performing critical evaluations of toxicology and epidemiology literature for setting exposure limits, characterizing dose-response relationships, and evaluating evidence for causal relationships between chemical exposures and adverse health effects. He has served on peer review committees for the U.S. Department of Defense and State of California.

In the area of product safety, Dr. Scofield has completed over 300 risk assessments involving the estimation of chemical exposure to consumer products or food. Many of these evaluations have been performed in support of assessments of compliance with California's Proposition 65. He has also performed risk assessments for clients in response to inquiries from the FDA and product recalls ordered by the CPSC. In addition, he has provided risk assessment in support of registration or regulation under FIFRA, CPSIA, and other State-specific product safety laws, as well as EU directives. Dr. Scofield has also provided product safety evaluations on behalf of companies considering the purchase of the rights to manufacture specific products or product lines or considering voluntary product recalls.

Dr. Scofield has taught and lectured extensively on risk assessment at universities, for private industries, and for the California Bar Association. He was an active member of the committee that developed the ASTM Standard, Risk Based Corrective Action (RBCA) for Petroleum Release Sites. In support of the American Petroleum Institute and the USEPA program to implement RBCA programs within State agencies, he taught basic toxicology, risk assessment, and risk-based corrective active action to several State agencies. He was part of a team that developed and taught a class in toxicology and risk assessment for project managers within the Department of Defense. Dr. Scofield was a member of the National Research Committee on Natural Attenuation. He has been an invited speaker at the Brownfields Asia Conference on two occasions and was invited to present a guest lecture on risk assessment to the Chinese Research Academy of Environmental Sciences in 2008. He was invited to participate in a special meeting of the Toxicology Section of the Royal Society of Chemists in the United Kingdom to participate in discussions on the topic of determining significant health risk. Dr. Scofield is frequently invited to speak on Proposition 65.

Academic Credentials and Professional Honors

D. Env., Environmental Science and Engineering, School of Public Health, University of California, Los Angeles, 1984
M.P.H., Environmental Health Management, University of California, Los Angeles, 1977
B.A., Biology, University of California, Los Angeles, 1975

Post-doctoral researcher, Department of Environmental Toxicology, University of California, Davis, 1983–1985

TRW Scholar, Toxicology, Department of Environmental Toxicology, University of California, Davis, 1982–1983

Publications and Presentations

Scofield R, Foley E. Employing effective defense strategies to explain complex science and medical terminology to judges and juries. American Conference Institute 3rd National Forum on Chemical Products Liability and Environmental Litigation, Chicago, IL, April 23, 2012.

Scofield R. How to interpret OEHHA's Hand-To-Mouth Exposure Guide. Panelist, 2011 Proposition 65 Clearinghouse Conference, San Francisco, CA, November 29, 2011.

Scofield R, Kalmes R. Strengthening defense positions despite regulatory changes made by the Obama Administration. American Conference Institute, Chemical Products Liability and Environmental Litigation Conference, Chicago, IL, April 29, 2010.

Scofield R. Streamlining environmental and planning processes to facilitate the development of Green Field projects. Panelist at the 5th Annual Public Private Partnership USA Summit, Washington D.C., March 13, 2009.

Scofield R. Cradle-to-cradle: From Proposition 65 to a new paradigm in green chemistry regulation. Invited Panelist, Los Angeles County Bar Association, Environmental Law Section, Los Angeles, CA, January 15, 2009.

Scofield R, Stubbs C, Mitchell K. Vapour intrusion assessment at Brownfield Sites: An overview of the primary issues and current practice. Keynote Lecture, Brownfield Asia 2008, Kuala Lumpur, Malaysia, October 21–23, 2008.

Scofield R. The evolving methods for evaluating health risks from "goods movement. Trends 2008; 39(6), July/August.

Scofield R, Caviness G, Posson M. Unique risk communication challenges posed by estimating human health risks for diesel exhaust. Air and Waste Management Annual Conference and Exhibition, Portland, OR, June 24–27, 2008.

Scofield R. Proposition 65's impact on the science of hazard identification and management. Panel Moderator, Proposition 65 News Conference, Napa, CA, October 5, 2006.

Scofield R, Ooi S, Struik E. Risk-based screening values: A cost-effective approach to contaminated land management. Keynote Lecture, Brownfields Asia 2006, Kuala Lumpur, Malaysia, September 2006.

Scofield R. How do you do a risk assessment. Panelist, Proposition 65 Clearinghouse Conference, San Francisco, CA, March 27, 2006.

Conder JM, Haroun L, Roberts S, Lockwood S, Scofield R, Hall S. Uptake of perchlorate by garden crops in perchlorate-impacted soil: Implications for risk assessment. Presented at Society of Environmental Toxicology and Chemistry (SETAC) North America, 26th Annual Meeting, Baltimore MD, November 13–17, 2005.

Scofield R. Risk assessment vs. risk assumptions: Where's the science? Panelist, Prop 65 Clearinghouse Conference, San Francisco, CA, March 11, 2005.

Scofield R. The role of risk assessment in decisions to restore or reduce risk. Invited presentation at the Theis Conference on Environmental Decision Making: Restoration Versus Risk Reduction, Sedona, AZ, January 16, 2005.

Scofield R. Tai TO. A critical evaluation of commonly used tables of soil cleanup values. Brownfields Asia 2004, Kuala Lumpur, Malaysia, June 2004.

Scofield R. Evaluating toluene exposure under Proposition 65. Presented at the 2001 National Environmental Health and Safety Conference for the Graphic Communications Industries, St. Louis, MO, March 25–27, 2001.

Scofield R. Superfund basic research in the next century: Setting the agenda. Invited Facilitator for National Institute of Environmental Health Sciences Workshop on Evaluating and Communicating Risk, Berkeley, CA, June 1998.

Ryer-Powder JE, LaPiree A, Scofield R. Derivation of a reference dose for a complex petroleum hydrocarbon mixture. Hum Ecol Risk Assess 1997, November.

Scofield R. Expansions and reformation of the application of chemical risk assessment to the clean-up of contaminated sites in the United States. Invited Presentation to the Australian Water and Wastewater Association, Melbourne, Australia, March 1997.

Scofield R, McConnell S. Overview of international directions being taken in risk assessment. Invited presentation to the Australian Water and Wastewater Association, Melbourne, Australia, March 1997.

Ryer-Powder JE, LaPiree A, Scofield R. Derivation of a reference dose for a complex petroleum hydrocarbon mixture. Hum Ecol Risk Assess 1997, November.

LaPierre A, Dizio S, Schum M, Wong K, Ryer-Powder J, Curley W, Scofield R. Site-specific exposure distributions for a state Superfund Human Health Risk Assessment (HHRA). Presented at the Society of Toxicology Meeting, March 1996.

Haag WR, Johnson MD, Scofield R. Direct photolysis of tricholoroethene in air: Effect of co-contaminants. Toxicity of Products, and Hydrothermal Treatment of Products 1996; 30:414–421.

CALTOX: An industrial perspective. Presented at Risk Assessment Issues in Toxics: A 1995 Update. Air and Waste Management Association and US Santa Barbara Extension, March 30, 1995.

Scofield R, LaPierre A. CalTox Model: Implications for risk management and decisions. Air & Waste Management Association, Santa Barbara, CA, March 31, 1995.

Ryer-Powder JE, Jain S, Chou G, Scofield R. Use of air dispersion modeling and the determination of a reference concentration to assess the potential for adverse health effects from the release of an Aniline derivative. Presented at the Society of Risk Analysis and Japan Section of SRA, December 1995.

Gates LJ, Libicki SB, Scofield R, Wilhelmi J. A flexible real-time ambient air monitoring program during Superfund Site redevelopment. EPA/AWMA Field Screening Methods for Hazardous Wastes and Toxic Chemicals, February 1993.

Scofield R. The use of epidemiology and risk assessment in the trial of a toxic tort case. Presented at the Defense Research Institute Symposium on Environmental, Hazardous Waste, and Toxic Tort Litigation, March 1993.

Scofield R. The role of risk assessment in expediting site remediation. Presented at Air and Waste Management Association Conference: Accelerating Underground Storage Tank Corrective Action, San Antonio, TX, March 1993.

Scofield R, Fitzwater P. When is enough enough? An Update on Setting and Achieving Cleanup Goals for Soil and Groundwater. California Environmental Law and Regulation Reporter, March 1993.

Scofield R. Current issues in the methods and application of quantitative risk assessment. Presented at the Annual American Industrial Hygiene Toxicology Symposium, April 1992.

Scofield R. The geologists new role in risk assessment of hazardous waste sites. Presented to the Southern California Geological Society, April 1992.

Scofield R. Current issues in Proposition 65 risk assessments. Presented at the Institute of Food Technologists Annual Meeting, Anaheim, CA, June 1990.

Larsen M, Conner K, Scofield R. Incremental risk analysis in teaching institutions. Proceedings, 1989 ASC/NCEE Meeting, Austin, TX, 1989.

Scofield R, et al. Multipathway risk assessment methodology compatible with California Decision Tree and U.S. EPA Superfund Guidelines. Proceedings, 5th National Conference on Hazardous Wastes and Hazardous Materials, Hazardous Material Control Research Institute, Silver Spring, MD, 1988.

Scofield R. The art of risk assessment: What role should science play. Panelist at the University of California Agricultural Issues Center Symposium on Chemicals in the Human Food Chain: Sources, Options, and Public Policy, June 1988.

Scofield R. Assessing environmental health risk of incineration of municipal wastes. Paper presented at the Conference on Municipal Waste Disposal: Landfilling and Incineration/Resource Recovery, University of Massachusetts, Amherst, MA, April 1988.

Daniels JI, Layton DW, Nelson MA, Olivieri AW, Cooper RC, Danielson RE, Bruvold HW, Scofield R, Hsieh DPH, Schaub SA. Organoleptic water quality: Health and economic impacts. In: Resource Mobilization for Drinking Water and Sanitation in Developing Nations. F.W. Montanari, T.P. Curran, and W. Saukin (eds), N.Y.: American Society of Civil Engineers, 1987.

Scofield R. An evaluation of the health hazards from pesticides in water supplies outside of the United States. Paper presented at the Meeting of the Society of Toxicology, San Diego, CA, March 1985.

Scofield R. A refined approach to the establishment of health criteria for water contaminants. Paper presented at the Meeting of the Society of Toxicology, San Diego, CA, March 1985.

Ghassemi M, Iyer R, McSorley J, Scofield R. Effects of synfuel use. Environ Sci Technol 1981; 15(8):866–873. Environmental Aspects of Synfuel Utilization, TRW Environmental Division, EPA Report No. 600/7-81-025, 1981.

Prior Experience

Principal and Practice Area Leader, ENVIRON International Corporation, 1985–2009
Post-doctoral Researcher, UC Davis Department of Environmental Toxicology, 1983–1985
Member Technical Staff, TRW Environmental Division, 1979–1983

Project Experience

Served on the U.S. National Research Council Committee on Natural Attenuation, which evaluated the effects of natural processes that affect the degradation and bioavailability of chemicals in the environment. His role on this committee was to evaluate the relationship between natural attenuation processes and risk assessment and the regulatory and community concerns associated with natural attenuation.

Performed more than 300 risk assessments under California's Proposition 65, including evaluations of consumer products, workplace exposures, and ambient environmental exposures. Services included deriving and critically evaluating No Significant Risk Levels (NSRLs) or Maximum Allowable Dose Levels (MADLs), performing exposure assessments, designing test protocols, and providing expert support for litigation and negotiation with plaintiffs.

On behalf of three utilities in California and the U.S. Navy, developed an approach to environmental management of former town gas sites based on comparison of site investigation data and post-remediation data to background levels of PAHs

Reviewed site investigation data and performed visual inspections of 60 town gas sites and used the information to help a major gas utility in the Midwest develop a priority classification system for managing the sites.

Directed or performed human health risk assessments for more than a dozen manufactured gas plant sites in southern California. Participated in negotiations with State regulators overseeing investigations and remediation, and participated in community meetings for two of the sites.

Developed risk-based exposure limits designed to ensure that people living and working in the immediate vicinity of former MGP sites are not exposed to levels of VOCs associated with adverse health effects as a result of emissions during remediation. Also developed an air-monitoring procedure and a set of action levels for VOCs designed to support the implementation of management measures to limit emissions of VOCs during remediation.

Performed human health risk assessments for diesel emissions from several rail yards in California and from proposed track expansion projects.

Performed risk assessments for emissions from several port operations in southern California.

Prepared a critical evaluation of the unit risk factor developed by the California Office of Environmental Health Hazard Evaluation for diesel particular matter.

Prepared a critical evaluation of the concentration-response function developed by the State of California for estimating numbers of premature deaths attributable to diesel particulate matter.

Preparing risk-based remediation goals for a former pesticide manufacturing site in southern California, and negotiating a remediation plan with EPA.

Providing peer review for the environmental management of two former pesticide manufacturing plants in northern California.

Performed multipath risk assessment of former oil refinery sites and petroleum spill sites using risk-based target concentrations to identify chemicals, exposure pathways, and areas requiring risk management.

Performed risk assessments for several chlorinated solvent spill sites, including an evaluation of risk posed by the spilled solvent and the degradation products.

Evaluated risks for vinyl chloride using EPA methodology to account for the extra sensitivity of children.

Performed complete risk assessments and provided risk assessment support for permit applications of several hazardous waste treatment, storage, and disposal facilities.

Performed a multipathway baseline human and ecological risk assessment for a former pesticide formulating facility in California. Worked with the State on behalf of the client to develop risk-based remediation goals for pesticides and related chemicals in soil and groundwater.

At more than 20 redevelopment sites and on behalf of real estate developers and lending institutions, calculated health risks associated with commercial and residential development of agricultural land with residual pesticides in surface soil. Negotiated remediation goals with agency representative and developed risk communication text as part of the developers' disclosure obligations.

Performed a screening evaluation of more than 300 volatile waste chemicals from a major scientific research institution in California, to identify those with the greatest likelihood of exceeding odor thresholds or causing adverse human health effects. Performed health risk assessment for 50+ volatile chemicals emitted from the fume hoods in several individual laboratories.

Managed the multipathway health risk assessment task for a major Superfund site, which included deriving exposure limits, developing site-specific human intake estimates, and characterizing human health risks for several remedial action alternatives.

Performed evaluations of food products, cosmetics, personal care products, and ambient releases for compliance with Proposition 65, including performing exposure estimates for products or releases; performing appropriate adjustments to account for dermal absorption; providing critical evaluation of cancer potency factors derived by the Cal/EPA; and recommending further product analysis or ambient monitoring.

Advised the manufacturer of a new pesticide in the selection and design of toxicology studies to be submitted to the EPA and EEC in support of a registration request. Monitored performance of the studies by contract laboratories.

Managed a project performing critical evaluations of the toxicology literature for several chemicals important in the lumber industry, including arsenic, creosote, chromium, and dioxins.

Provided a critical evaluation of the toxicology and epidemiology literature that serve as the basis for EPA exposure standards for inorganic arsenic.

Reviewed the toxicology and epidemiology literature for fiberglass and evaluated the strength of evidence for a causal link between human exposure to fiberglass and lung cancer.

Provided critical evaluation of and suggested improvements for a multipathway risk assessment performed for a large incinerator in southern California.

Managed the development of a multipathway risk assessment methodology to be applied to town gas sites using the California Decision Tree Methodology.

Critically evaluated a proposed method for estimating the carcinogenic potency of diesel exhaust.

Managed the preparation of toxicity profiles and safe exposure limits to be used for the assessment of risks at a Superfund and other waste sites. Also managed a project to identify chemicals present at waste sites for which risk assessments should be performed.

Participated in the development of toxicity testing requirements and guidelines for hazardous waste testing programs at EPA's Office of Solid Waste.

Prepared critical evaluations of epidemiology studies linking liver disease to dioxin exposure.

Prepared toxicity evaluations of over 100 chemicals for inclusion in Material Safety Data Sheets.

Provided technical assistance in exposure and toxicology to the owner of a large lead smelter negotiating remediation goals for lead and other metals with USEPA for a Superfund site.

Provided a critical evaluation of the literature on lead as a reproductive toxicant, and recommended a no-effect level to be used under California Proposition 65.

Professional Affiliations

- Genetic and Environmental Toxicology Association
  - President-Elect 1996–1997
  - Elected to Executive Board 1992–1993
- Northern California Chapter, Society of Toxicology
  - Appointed Program Chairman 1991 and 1992
- Society for Risk Analysis
- Northern California Chapter of the Society of Risk Analysis
  - Elected Treasurer 1992–1993 and 1996–1997

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Gwendoline A. Caviness, MPH
Managing Scientist

Professional Profile

Ms. Gwendoline Caviness is a Managing Scientist in Exponent's Health Sciences Center for Exposure Assessment and Dose Reconstruction. Ms. Caviness has over 20 years of experience in human health exposure and risk assessment. Specific areas of emphasis include risk-based property assessment, vapor intrusion, air toxics, estimation of exposure to chemicals in consumer products, and strategic risk management planning.

Ms. Caviness has managed and performed human health risk assessments at over 100 hazardous contaminated sites, including Sites regulated under CERCLA, RCRA sites, and Federal and State Brownfields redevelopment programs. She has worked on all aspects of human health risk assessment including evaluating analytical data, performing exposure analyses, evaluating toxicity information, and estimating cancer risks and noncancer health effects from exposure to chemicals in various environmental media (including soil, soil gas, sediment, air, groundwater, and surface water). Although she has performed risk assessments to evaluate a wide range of contaminants, Ms. Caviness specializes in PCBs, dioxins, pesticides, and chlorinated solvents (PCE, TCE, vinyl chloride). In particular, she has extensive working knowledge of the technical and regulatory issues related to PCBs. Ms. Caviness also has extensive experience representing clients in agency negotiations concerning calculated risks from and clean up goals for PCBs.

Ms. Caviness frequently interacts with state and federal regulatory agencies, and provides technical support for clients at client/agency meetings and negotiations. She has extensive working knowledge of the factors that influence agency decision-making and has demonstrated an ability to produce reports and present recommendations that meet agency requirements for approval.

Academic Credentials and Professional Honors

M.P.H., Environmental Health, Boston University, 1992
B.S., Clinical Psychology, Tufts University, 1986

Prior Experience

Senior Manager, ENVIRON International Corporation, 2000–2012
Risk Assessor, Tetra Tech EM, Inc., 1995–1999
Environmental Scientist, Weiss Associates, 1992–1995
Environmental Specialist, Boston Public Schools, 1990–1992
Environmental Legal Assistant, Schnader, Harrison, Segal, and Lewis, 1988–1990

Relevant Experience

Managed or performed human health risk assessments at over 100 contaminated sites, including properties and facilities regulated under the Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA), RCRA, and various Federal and State environmental programs. These sites have included former waste disposal, mining, research laboratory, chemical manufacturing, manufactured gas plant, and active and closing military facilities. Multiple projects involved performing health assessments in support of Brownfields redevelopment and reuse as residential, commercial, and recreational and school properties. These assessments included evaluation of a wide range of contaminants (including PCBs), media, and exposure pathways at Sites situated in different geographical locations and environmental settings. Selected project experience highlighted below:

- Managed activities related to human health risk assessment for CERCLA sites under the Comprehensive Long-Term Environmental Action Navy (CLEAN) contract. Responsibilities included preparation of human health risk assessments, negotiating with regulatory agencies (DTSC, EPA, City of San Francisco), and presenting risk assessment results to the public and other stakeholders.

- Conducted numerous assessments to evaluate health effects associated with potential exposure to PCBs. These assessments involved applying multiple approaches for analyzing and reporting PCB concentrations including total PCBs, 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) Equivalents, and Aroclors.

- Performed a risk assessment for a facility involved in the manufacture of high-technology products and regulated under RCRA. The purpose of this assessment was to demonstrate that risks to on- and off-site populations associated with exposures to polychlorinated biphenyls (PCBs), chlorinated solvents, and metals had been adequately mitigated through engineering controls and various remedial measures.

- Evaluated health effects associated with potential exposures to PCBs in sediments. The assessment, which evaluated possible exposures to both human and ecological receptors, involved complex fate and transport modeling to assess potential migration of PCBs in surface water to the San Francisco Bay. The results of the risk assessment were used to demonstrate that the PCBs at the Site did not pose a threat to human or ecological receptors.

- Ms. Caviness is also familiar with the regulatory requirements of the DTSC school sites program and has applied the technical methods specified for this program. In addition, while in graduate school, she worked for the Boston Public Schools as an environmental specialist. Her responsibilities included conducting asbestos and lead-based paint surveys, implementing programs designed to prevent or mitigate the health risks from these constituents, and responding to concerns from students, parents, and employees within the school community.

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Renee M. Kalmes, M.S.P.H., CIH
Senior Managing Scientist

Professional Profile

Ms. Renee Kalmes is a Senior Managing Scientist in Exponent's Health Sciences Center for Exposure Assessment and Dose Reconstruction. Ms. Kalmes is a certified industrial hygienist with over 20 years of health risk assessment experience. In this role, she is responsible for designing, conducting, and managing technical studies addressing environmental and occupational impacts of chemical agents. Ms. Kalmes has developed and conducted sampling programs to evaluate potential chemical exposure in air, soil, and groundwater and has prepared over 100 exposure and risk assessment for various properties, including former landfills, industrial, residential, recreational, and agricultural properties and schools, including Brownfields Sites. She has evaluated potential exposure to metals, pesticides, volatile organic chemicals, and petroleum products in soil, groundwater and air and developed clean-up levels and other risk management recommendations. Ms. Kalmes has evaluated soil vapor intrusion issues through use of soil vapor modeling and air monitoring tools. She has communicated risk results to a variety of stakeholders, including neighborhood, worker, and community groups. Ms. Kalmes has taught numerous courses on risk assessment at the University of California Extension Program and has developed and conducted more than 100 training programs. Ms. Kalmes frequently interact with local and state regulatory agencies and has testified as an expert in the area of environmental risk assessment as well as beryllium, sulfide, and lead exposure.

Ms. Kalmes also specializes in conducting and directing studies to assess potential exposure to consumer products including evaluation of lead, phthalates, benzene, toluene, cadmium, arsenic, ethyl benzene, and formaldehyde. She has developed sampling protocols to evaluate FDA and CPSC and Proposition 65 claims, specifically addressing dermal contact and incidental ingestion of metals associated with hand-to-mouth activities.

Ms. Kalmes has also conducted numerous exposure assessment analyses of community and occupational exposure data for use in cohort and case-control epidemiologic studies. In this role she has designed and managed air sampling programs to evaluate various job classifications to be used in epidemiological studies. She has evaluated community and occupational exposure issues associated with asbestos, beryllium, sulfides, and chlorinated hydrocarbons.

Academic Credentials and Professional Honors

M.S., Air and Industrial Hygiene, University of North Carolina, 1983
B.S., Environmental Science, Purdue University, 1981

Licenses and Certifications

Certified Industrial Hygienist, Comprehensive Practice since 1985

Publications and Presentations

Kalmes R, Brorby G, Lowney Y. Dioxin/furan site-specific bioaccessibility for application at Industrial Site. Battelle 8th International Conference, Remediation of chlorinated and Recalcitrant Compounds, Monterey, CA, May 24, 2012.

Hong S, Kalmes R, Posson M, Richter R, Fedoruk M. Formaldehyde exposure associated with use of keratin hair-smoothing products. Poster presented at the Society of Toxicology, San Francisco, CA March 11–15, 2012.

Kalmes R. Moderator: 2011 Proposition 65 Conference. Session: Testing Labs: Grading their Role, San Francisco, CA, November 29, 2011.

Lowney Y, Brorby G, Kalmes R. Site-specific bioaccessibility of dioxins/furans in soil. Poster presented at the Society of Toxicology, Washington D.C., March 6–10, 2011.

Kalmes R. Effective indoor air sampling and risk communication strategies to address indoor BTEX Levels at former UST site. Presented at American Industrial Hygiene Conference and Exposition, PDC 128, May 2010.

Kalmes R. Hicks J. A method to evaluate lead surface dust concentrations in non-residential settings. Presented at American Industrial Hygiene Conference and Exposition, PDC 138, June 2009.

Kalmes R, Brorby G. Lead, lead everywhere—Evaluating potential exposure to heavy metals in consumer products. Presented at American Industrial Hygiene Conference and Exposition, PDC 192, May 2008.

Kelsh MA, Alexander D, Kalmes R, Buffler P. Personal use of hair dyes and risk of bladder cancer: A meta-analysis of epidemiologic data. Cancer Causes and Control, January 2008.

Brorby G, Kalmes R, Goswami E, Mowat F, Sheehan P. Evaluating exposure to consumer products. Presented at Society for Risk Analysis Meeting, December 6, 2006.

Goswami E, Kalmes R. Exposure to formaldehyde during use of nail care products. Presented at American Industrial Hygiene Conference and Exposition, Poster #269, May 2006.

Mandel J, Kelsh M, Mink P, Alexander D, Kalmes R, Weingart M, Yost L, Goodman M. Occupational trichloroethylene exposure and non-Hodgkin's lymphoma: A review and meta-analysis. Occup Environ Med 2006, April 26.

Sheehan P, Brorby G, Kalmes R, Mowat F, Richter R, Finley B. Characterization of the cumulative exposures of U.S. automobile mechanics. AIHce, Anaheim, CA, May 23–26, 2005.

Buffler PA, Kelsh M, Kalmes R, Lau E, Chapman P, Brorby G. A nested case-control study of brain tumors among employees at a petroleum exploration and extraction research facility. J Occup Environ Med 2005.

Kalmes R, Brorby G, Kelsh M, Buffler P. Exposure assessment for an epidemiologic study of brain tumors among petrochemical research workers. Presented at the American Industrial Hygiene Conference in Anaheim, CA, May 25, 2005.

Hessel PA, Kalmes R, Smith T, Lau E, Mink P, Mandel J. A nested case-control study of prostate cancer and Atrazine exposure. J Occup Environ Med 2004; 46(4).

Buffler PA, Kelsh M, Chapman P, Wood S, Lau E, Golembesky A, Wood R, Kalmes R, Brorby G. Primary brain tumor mortality at a petroleum exploration and extraction research facility. J Occup Environ Med 2004; 46(3).

Kolanz ME, Madl AK, Kelsh MA, Kent MS, Kalmes RM, Paustenbach DJ. A comparison and critique of historical and current exposure assessment methods for beryllium: implications for evaluating risk of chronic beryllium disease. Appl Occup Environ Health 2001; 16(5):592–614.

Paustenbach DP, Burke ML, Shum M, Kalmes RM. Airborne concentrations of ethyl and methyl cyanoacrylate in the workplace. Am Ind Hyg Assoc J 2001; 62(1).

Madl AK, Kalmes RM, Paustenbach DJ. Community one-hour inhalation exposure limits for chemical irritants among five agencies in the United States. Presented at the American Industrial Hygiene Conference and Exposition, Toronto, Canada, June 7–9, 1999.

Madl AK, Kalmes RM, Paustenbach DJ. Comparison of acute inhalation exposure levels for chemical irritants among five agencies in the United States. Presented at the Society of Toxicology Annual Meeting, New Orleans, LA, March 14–18, 1999.

Kalmes RM, Mathur DB. Application of risk-based strategies and the containment zone provision of the Regional Water Quality Control Board, San Francisco Bay Region to implement the first containment zone for a heavy metal (mercury) in California. Presented at the Annual Meeting of the Society for Risk Analysis, New Orleans, LA, December 8–11, 1996.

Paustenbach DJ, Jernigan JD, Bass R, Kalmes R, Scott P. A proposed approach to regulatory contaminated soil: Identify safe concentrations for seven of the most frequently encountered exposure scenarios. Regul Toxicol Pharmacol 1992; 16:21–56.

Prior Experience

Managing Scientist, McLaren/Hart ChemRisk, 1989–1999
Industrial Hygienist, Clayton Consulting Company, 1987–1989
Health and Safety Engineer, Chevron Chemical Company, 1984–1987
Intern, Shell Oil Company, 1983
Intern, IBM, 1981–1983

Project Experience

Proposition 65/Product Evaluations

Conducted Proposition 65 evaluations assessing potential exposure to children and adults for various chemicals including benzene, toluene, lead, cadmium, arsenic, phthalates, ethyl benzene, and formaldehyde, and various products (PVC, jewelry, containers, toys, cookware and tableware, and appliances). Developed sampling protocols to evaluate FDA and CPSC compliance, as well as exposure to metals in consumer products, specifically addressing dermal contact and incidental ingestion associated with hand-to-mouth activities. Managed product-testing and compliance programs for numerous companies involving heavy metal content of products. Performed assessment that evaluated dermal and oral migration of phthalates in various consumer products.

Exposure Reconstruction/ Occupational Epidemiology

Conducted numerous exposure assessment analyses for use in cohort and case-control health studies including petrochemical, aircraft, chemical, and agricultural industries. Designed and managed air sampling program to obtain 8-hour, peak and short-term levels for various job classifications to be used in epidemiological studies. Performed exposure reconstruction studies to evaluate chemicals such as beryllium, benzene, silica, formaldehyde, lead, and asbestos.

Industrial Hygiene/Air Sampling

Provided reviews of health literature, air sampling methods, and worker exposure data for silica, beryllium, and asbestos and their associated products. Conducted air sampling for numerous compounds such as benzene, other volatiles, oil mists, pesticides, and particulates in various occupational settings. Designed studies to simulate and reconstruct historical exposures in occupational and residential settings to volatile chemicals in solvents. Audited and reviewed health and safety compliance programs for petrochemical, agricultural, laboratory, and chemical manufacturing facilities, including review of labeling, MSDSs, training manuals, safe chemical handling procedures, ventilation, and employee training, and chemical inventory procedures. Assessed use of medical monitoring in occupational and community populations.

Risk Assessment/Brownfields

Managed numerous assessments of contaminated property for future residential, commercial, and school developments, while working closely with regulatory agencies to obtain approval of health-based strategies. Key issues for these sites included soil gas vapor migration, particulate emissions, and groundwater transport and fate modeling. Developed health based cleanup levels for scenarios such as residential, commercial, construction, and trespassers. Has successfully worked on sites involving chemicals such as TCE, PCE, 1,1,1,-TCA, EDB, PAHs, arsenic, lead, barium, and mercury.

Air

Managed more than 20 air risk assessments associated with the California Hot Spots Program (AB-2588) for aerospace, hospitals, chemical, and manufacturing facilities, including evaluation of hexavalent chromium, benzene, and propylene oxide. Also performed analyses of large hydrogen sulfide air monitoring datasets to evaluate potential sources and trends within a state.

Professional Affiliations

- American Industrial Hygiene Association (member)
- Northern California American Industrial Hygiene Association
- American Society for Testing Material, Risk Assessment Committee (Former Member)

Attachment 3

Company Profile

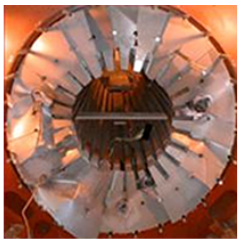
Exponent is a scientific and engineering consulting firm that provides solutions to complex technical problems. Our multidisciplinary team of scientists, engineers, physicians, and business consultants performs in-depth research and analysis in more than 90 technical disciplines. At Exponent, we pride ourselves on the high quality of our approximately 900 employees. More than 700 are degreed technical professionals, and more than 350 have earned an M.D. or Ph.D. Operating in 20 regional offices and 5 international locations, Exponent is publicly traded on the NASDAQ exchange under the symbol EXPO.

Over the years, we have received recognition for assisting clients with their most important challenges or dire disasters. We have investigated most of the major industry crises that make the news: the grounding of the Exxon Valdez, the walkway collapse at the Kansas City Hyatt, the flooding of downtown Chicago, and the attack on the World Trade Center. However, most of our work is actually helping clients assess their daily technical issues and make informed business decisions.

The problems that Exponent tackles take many forms other than disasters or accidents involving a product or property. It may be a technical, health, or environmental issue related to a developing product, such as potential radiation from cell phones, whose resolution needs to be accurate, innovative, and cost effective. A regulatory issue may have a critical impact on a client's future business, and may turn on how the product can be sold or serviced. Often, a client calls because a production facility is suffering unusual down time, or a production machine has failed, or the recently received component parts just don't seem to work right. We assist clients contemplating any business transaction that requires careful scientific research and analysis as part of the due diligence, including assessments of the value of intellectual property and patents.

When a major disaster strikes, the media is not far behind, and an affected client needs answers now. Our team will perform either in-depth scientific research and analysis, or very rapid-response evaluations, to provide our clients with the critical information they need. The Exponent name is recognized for its integrity, objectivity, independence, and professionalism. Our corporate core values drive a commitment to client service that enables us to provide consistently high quality to client's worldwide. We are proud to say that our in-house quality management system is certified to ISO 9001. Exponent is also authorized by the General Services Administration to provide professional engineering services to federal agencies. Our clients include a wide range of manufacturers, utilities, insurers, industry groups, government agencies, venture capital companies, and law firms. Our professionals have provided consulting services to many of the Fortune 500 companies and numerous government agencies.





Air Quality

Overview

Exponent has truly unique capabilities when it comes to air quality assessment. In addition to providing emissions inventory, dispersion modeling, monitoring (stack and ambient), regulatory and litigation support services, our capabilities extend to other aspects not found in traditional consulting firms. Our chemical and combustion engineers provide support in calculating emissions related to issues such as new process emissions, fugitive emissions, or emissions from fires, explosions, accidental releases, and other "unusual" occurrences that happen in the real world. Our engineers don't just go to a book or website to look up the best air pollution control design. Our engineers have experience with the design, installation, and operation of such systems. Exponent's staff of environmental chemists, toxicologists, epidemiologists, ecologists, and physicians assist in understanding the potential risks of predicted and monitored air quality concentrations and particle deposition. Using this input, our air quality scientists and meteorologists conduct thorough analyses. So, Exponent's air quality capabilities extend from the combustion zone to the "breathing zone" and every point in between.

With our reputation for cutting-edge innovation in atmospheric sciences, Exponent has conducted many projects investigating emissions, ambient air quality, and atmospheric phenomena. Our experience includes compliance, permitting, indoor air and atmospheric dispersion and deposition modeling, ambient air quality and emissions monitoring, rule assessment, pollution control research, and green house gas studies. We are frequently called upon to investigate unusual atmospheric releases of chemicals, assess air pollution risks, simulate transport and fate of chemical substances, or develop measures of prevention and control, such as emergency preparedness and response. We have conducted air quality analyses in locations throughout the U.S. and internationally including desert, tropical, temperate, and arctic environments and have communicated our analytical results effectively to the general public, regulatory bodies, and in courts of law.

We use the latest measurement techniques to quantify gaseous and particulate air pollutants, both on the ground and in-stack. Using state-of-the-art regulatory models we determine the ambient air quality impacts due to emissions from a single emissions source, a multi-source plant, or an entire city. We are also experienced in alternative modeling methodologies, such as computational fluid dynamics (CFD) and building multi-zone models to estimate exposures for people indoors. And, there are circumstances in which we have recommended no modeling or the use the existing models. Simple or complicated. Standard or cutting-edge. Our approach is to solve problems efficiently.

Many of our projects involve historic release reconstruction. Some projects have required us to analyze legacy site releases or accidental releases to determine the impacts to the community. Other projects have required us to assess the ambient air quality impact of fugitive and point source emissions from historical and current industrial operations. Aside from site-specific assessments, our staff has dealt with regional-scale air quality issues both in the United States and Overseas. We can advise clients on broad, strategic issues related to air quality management and planning.

We have extensive experience in indoor air quality. Our scientists and engineers conduct field measurements and computer simulations to assess soil vapor intrusion. Our industrial hygienists evaluate exposure to chemicals in workplaces. We use building models to estimate indoor pollutant concentrations caused by human activities indoors and by outdoor air entering the building. Our Thermal scientists assess combustion products and production of CO that might adversely impact a person's health. We have conducted room-scale experiments in our laboratories to reconstruct indoor exposures.

Exponent has worked on climate change and other global environmental compliance issues for more than 10 years. Our personnel include the lead author of one chapter in the Intergovernmental Panel on Climate Change's Fourth Assessment Report, participants in state global climate change panels, and scientists who have testified before legislative bodies on global climate change. We work with clients to develop strategic responses to climate-related demands, public relations, and potential impacts to their assets. We have the expertise to perform a third-party verification for greenhouse gas registry or carbon trading scheme. Teaming with Exponent's diverse staff of ecologists, and process and combustion engineers, our environmental scientists can advise clients on carbon management strategies that are tailored to their industry.

Clients benefit from our multidisciplinary approach, which includes the support of chemical engineers, combustion specialists, atmospheric modelers, and experts in health effects of air pollution. Our engineers gather information related to the process that has caused the release of chemicals into the air. Our atmospheric scientists collect available meteorological data and perform computer simulations of the dynamics of the chemical cloud and its dispersion in the environment. Our environmental chemists determine the transformation and fate of the transported chemicals. Our toxicologists and health science professionals assess the potential health impact caused by the release in the affected area. Our statisticians evaluate the uncertainty of the results. All these capabilities allow Exponent to provide its clients with a scientifically sound assessment of the dynamics and potential consequences of these releases.

Chemical Fate & Transport

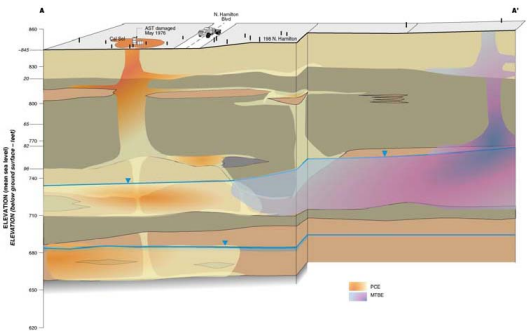
Overview

Exponent provides state-of-the-art expertise in the field of chemical transport and fate. Our scientists and engineers have published hundreds of peer-reviewed scientific articles, and advised numerous government entities and industrial clients on chemical transport and fate issues. We have been recognized for our work in toxic tort, property damage, cost allocation, and Natural Resource Damage Assessment (NRDA) cases nationwide.

Exponent's chemical fate-and-transport services cover a broad spectrum of chemical contaminants and involve evaluations in media such as air, water groundwater, soil, surface sediment, and house dust. We also evaluate remedial alternatives, apportion sources, and reconstruct exposure.

Exponent's cost-effective, scientifically defensible, and realistic assessments begin with the development of a conceptual site model, which often identifies the key pathways that require evaluation.

We routinely provide expert evaluations based on conceptual site models and assessment of existing data. In cases where supplemental information is required, our scientists and engineers are accomplished at designing field and laboratory studies, and employing state-of-the-art experiments and methods to resolve scientific issues.



Exponent possesses strong capabilities in data evaluation and model prediction. This includes GIS and statistical capabilities to evaluate trends in contaminant concentrations in space and time. It also includes numerical modeling of chemical transport and fate in air, unsaturated soil, groundwater, sediments, and water bodies (rivers, lakes, estuaries, oceans). Depending on the specific project objectives, the numerical models developed by Exponent can range from simple to complex. Examples of the latter include state-of-the-art geochemical and hydrological models developed specifically by Exponent scientists and engineers to understand chemical mobility in multifaceted environmental systems.

Exponent provides unique synergy between environmental science and our failure analysis, drawing on engineering expertise in material failures , fires and explosions, and structural failures. We use this expertise when evaluating the source, mechanism, and timing of environmental releases. In addition, our environmental scientists and engineers work closely with ecological and health scientists, utilizing these capabilities to understand exposure and effects. This cooperation among the diverse Exponent practices provides our clients with unmatched value and resources in successfully managing their regulatory and litigation needs.

Environmental Engineering

Overview

Environmental engineering involves the application of engineering principles in solving environmental problems. These environmental studies may involve determining the source and magnitude of contaminant releases, assessing contaminant transport mechanisms in air or water, evaluating alternative mitigation measures, and monitoring the effectiveness of pollution control and treatment systems. Environmental engineering projects draw on the expertise of several engineering disciplines, including civil (e.g., hydraulics, hydrology, and geotechnology), chemical (e.g., chemical behavior and fate), and mechanical (e.g., industrial processes and thermodynamics).

Exponent's environmental engineers apply their skills and many years of experience to address air and water quality issues under the Clean Air Act and the Clean Water Act; solid and hazardous waste containment, treatment, and disposal issues under the Resource Conservation and Recovery Act (RCRA) and the Toxic Substances Control Act; and contaminated site investigation and remediation issues under RCRA and the Comprehensive Environmental Response, Compensation and Liability Act.

Exponent's wide range of scientific and engineering talents and our multidisciplinary approach to solving our clients' problems allow us to provide in-depth assistance in practically any area of interest. Our studies frequently involve toxicologists and ecologists to establish site-specific remedial action goals, corrosion engineers to determine the cause of a chemical release, thermal engineers to assess industrial process emission rates, statisticians to evaluate the correlation of commingled contaminants to potential sources, and hydrologists and aquatic biologists to design restoration programs for streams and wetlands.

Site Investigation & Remediation Consulting

Overview

Exponent's site investigation and remediation consulting practice provides focused environmental studies, cost-effective remedial solutions, and positive regulatory outcomes to industry clients. Our multidisciplinary staff of chemists, engineers, ecologists, geologists, hydrologists, soil scientists, and toxicologists offers the breadth of technical experience that allows our clients to achieve their business needs and strategic objectives while remaining in compliance with regulatory requirements.

We have extensive project experience under the following regulatory frameworks:

- CERCLA remedial investigation/feasibility studies (RI/FSs)
- RCRA facility investigations/corrective measure studies (RFIs/CMSs)
- State-led voluntary cleanup programs (VCPs)
- State-led CERCLA programs
- Technical analyses to support Environmental Impact Statements (EISs)
- Brownfields regulations

Our services include:

- Regulatory strategy development
- Field investigation design and program management
- Data management and database development
- Transport and fate analysis, including simple and sophisticated modeling of indoor and outdoor air, soils (vadose zone), surface water, sediments, and groundwater
- Natural attenuation studies
- Bioavailability studies
- Sediment investigations
- Human health and ecological risk assessment
- Remedial alternatives analysis
- Bench-scale testing
- Remediation and redevelopment oversight
- Remediation technology evaluation
- Liability management

We investigate sites and facilities to identify chemical contaminants in air, soil, sediment, surface water, and groundwater that may pose a risk to human health and/or the environment. The goals of these investigations vary among sites and facilities, depending on the regulatory framework, the types of chemicals and exposure conditions, and the eventual use or disposition of the property or facility.

Depending on the site conditions, Exponent scientists and engineers use a variety of innovative strategies to protect human health and the environment while reducing or avoiding unnecessary remediation costs. These strategies may include the use of bioavailability assessment, focused remediation, or natural attenuation approaches. We also incorporate phased approaches to ensure that investigations and possible remedial actions remain focused and cost effective.

Our demonstrated success in understanding our clients' needs, and in applying sound scientific, engineering, economic, and management skills at a variety of sites and diverse facilities, has earned Exponent an outstanding reputation.

Asbestos

Overview

Exponent's staff has considerable experience in various aspects of asbestos-related research. Asbestos is a fibrous mineral that has been used in a variety of products and applications throughout the world. Many uses have been banned or discontinued, such as in insulation and other friable materials, due to the unacceptable risks to populations that may be exposed to these materials. The potential risks of a product can vary widely depending on the exposure and fiber characteristics (e.g., type, length), as well as specific tasks performed and the duration and frequency of these tasks.

Exponent scientists have expertise in the disciplines needed to evaluate health risks associated with different types of asbestos exposures, including exposure assessment, epidemiology, industrial hygiene, exposure modeling, materials science, toxicology, and risk assessment. Exponent scientists are knowledgeable of current government activities regarding regulation of asbestos, health risk assessments of asbestos, asbestos-related occupational health and safety, and warnings-related issues. We also have several licensed MDs and registered nurses on staff who can aid in review of medical records and evaluation of differential diagnoses. In addition to health-related aspects of asbestos, Exponent's materials scientists have experience in evaluating and re-formulating historical products for purposes of exposure simulation, and have expertise in visualizing and characterizing asbestos-containing products in our technical laboratories. Exponent's staff also includes economists with extensive experience in long-term asbestos liability estimation for matters pertaining to insurance coverage, financial reporting, bankruptcy proceedings, and due-diligence analyses for mergers and acquisitions.

Exponent's staff is well acquainted with the available literature and issues related to numerous historic asbestos-containing products, and have independently evaluated potential exposures resulting from many of these products, including:

- Gaskets and packing
- Friction materials (e.g., brakes and clutches)
- Roof mastics, coatings, and cements
- Flexible duct connectors
- Joint and drywall compounds
- Stucco and cement compounds
- Mastics and adhesives
- Talc products
- Phenolic molding compounds and resins
- Ceiling and floor tiles
- Attic insulation
- Electric appliances
- Baking ovens
- Industrial equipment
- Residential, commercial, and industrial boilers
- Pipe wrap

We have performed numerous exposure simulations to measure and characterize potential exposures from various specific products. In addition, we have performed dose reconstructions to re-create and estimate the potential exposure to products during specific tasks and occupations.

Representative Publications

2013

Goswami E, V Craven, DL Dahlstrom, D Alexander, F Mowat. Domestic asbestos exposure: A review of epidemiologic and exposure data. Int J Environ Res Public Health 2013; 10(11):5629-5670. http://www.mdpi.com/1660-4601/10/11/5629

2012

Brorby, GP, PJ Sheehan, DW Berman, KT Bogen, SE Holm. Exposures from chrysotile-containing joint compound: Evaluation of new model relating respirable dust to fiber concentrations. Risk Anal 2012; doi:10.1111/j.1539-6924.2012.01847.x (e-pub ahead of print).

2011

Teta, MJ. Mesothelioma in a Connecticut friction plant: The need for transparency and exposure information in attribution of risk. Ann Occup Hyg 2011; 55(7):817–819. Comment on: Ann Occup Hyg 54(6):692–696.

Sheehan, PJ, GP Brorby, DW Berman, KT Bogen, SE Holm. Chamber for testing asbestos-containing products: Validation and testing of a re-created chrysotile-containing joint compound. Ann Occup Hyg 2011; 55(7):797–809.

Bogen, KT, G Brorby, DW Berman, P Sheehan, M Floyd. Measuring mixed cellulose ester (MCE) filter mass under variable humidity conditions. Ann Occup Hyg 2011; 55(5):485–494.

Brorby, GP, PJ Sheehan, DW Berman, KT Bogen, SE Holm. Potential artifacts associated with historical preparation of joint compound samples and reported airborne asbestos concentrations. J Occup Environ Hyg 2011; 8:271–278.

Cantor, RA, M Lyman, R Reiss. Asbestos claims and litigation. In: Product Liability. Cantor, RA (ed), ABA Publishing: Chicago IL, 2011:125–145.

2010

Sheehan, P, F Mowat, R Weidling, M Floyd. Simulation tests to assess occupational exposure to airborne asbestos from artificially weathered asphalt-based roofing products. Ann Occup Hyg 2010; 54(8):880–892. Corrigendum 2010; 55(7):827.

Moolgavkar, S, J Turim, DD Alexander, EC Lau, CC Cushing. Potency factors for risk assessment at Libby, Montana. Risk Anal 2010; 30(8):1240–1248.

2009

Teta, MJ, MA Wagner. Consistency and synergy. Blood 2009; 114(9):2000–2001. Comment on: Blood 113:3679–3681.

Richter, RO, BL Finley, DJ Paustenbach, PRD Williams, PJ Sheehan. An evaluation of short-term exposures of brake mechanics to asbestos during automotive and truck brake cleaning and machining activities. J Exp Sci Environ Epidemiol 2009; 19:458–474.

Moolgavkar, SH, R Meza, J Turim. Pleural and peritoneal mesotheliomas in SEER: Age effects and temporal trends, 1973–2005. Cancer Causes Control 2009; 20:935–944.

2008

Teta, MJ, PJ Mink, E Lau, BK Sceurman, ED Foster. US mesothelioma patterns 1973–2002: Indicators of change and insights into background rates. Eur J Cancer Prev 2008; 17(6):525–534.

Wagner, ME, LB Travis. Mesothelioma and asbestos. Regulat Toxicol Pharmacol 2008; 52:353-354. Comment on: Regulat Toxicol Pharmacol 52:S223–S231.

Brorby, GP, PJ Sheehan, DW Berman, JF Greene, SE Holm. Re-creation of historical chrysotile-containing joint compounds. Inhal Toxicol 2008; 20:1043–1053.

2007

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Exposure Assessment

Overview

Exposure assessment is one of four major components in the risk assessment process. Characterizing and estimating the magnitude of potential exposures is an essential component for evaluating health risks posed by a particular chemical or physical agent. Exposure depends on various characteristics of the agent, such as particle shape or fiber size (for inhalation), form of radiation, chemical composition**,** bioavailability**,** human behavior**,** whether natural barriers or personal protective equipment prevent actual exposure, and whether the substance is transformed within the body.

Characterizing historical occupational, environmental, or consumer product exposures is challenging, because there are frequently few or no chemical concentration data specific to the historical exposure event(s), and in many cases, the occupational or environmental conditions have changed or the consumer product is no longer produced or has been reformulated. Over the past decade, there has been growing interest in historical exposure(s) that individuals or groups experienced as part of their activities. Exponent has significant experience in this area, and has helped clients assess exposures from various consumer products using exposure simulation, where industrial hygiene (exposure) data are collected during testing of re-formulated products. The term coined for historical exposure assessments where specific doses are calculated on a job-specific, task-specific, or person-specific basis is "exposure reconstruction" or "dose reconstruction." Exponent also has substantial experience assisting clients with planning for new facilities or products using prospective exposure assessment techniques. These forward-looking assessments are of great value to clients in getting necessary permits, mitigating potential future exposures, and limiting future liabilities.

Exponent's health scientists, particularly those in the Center for Exposure Assessment and Dose Reconstruction, provide a depth and breadth of knowledge and expertise to our clients from a variety of multidisciplinary perspectives. Exponent complements this strong and diverse depth of scientific experience with its considerable knowledge base regarding current government and international standard-setting organizations' activities regarding risk assessment, mathematical modeling, and exposure limits. Exponent's work is supported and supplemented by our close ties with analytical laboratories for fast turnaround time on samples and our ability to design, construct, and operate exposure-testing chambers.

Exposure Assessment

Overview


Exposure assessment is the science of estimating human exposure to chemical, physical, and biological agents, accounting for the frequency, magnitude, and duration of the exposure events. Exposure estimates can be compared to toxicity benchmarks or guidelines to assess potential risks to human health, and are used for many purposes, including in epidemiology, risk assessment, and regulatory compliance.

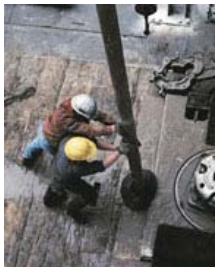
- Atmospheric Sciences
  - Computational Fluid Dynamics Modeling in Atmospheric Sciences
- EMF / RF Exposure & Health
- Exposure Assessment
  - Bioavailability & Exposure Assessment
  - Dose Reconstruction
  - Exposure Simulation
  - Proposition 65 (California)
- Green Building / Sustainable Services
- Mathematical Exposure Modeling
- Other Agent Specialities
  - Asbestos
  - Metals & Metalloids
  - Nanotechnology
  - Organic Solvents
  - Perfluorooctanoic Acid (PFOA)
  - Petroleum Hydrocarbons / Benzene
  - Phthalates
  - Semi-Volatile Organic Chemicals
  - Silica
- Product Stewardship
  - Product Stewardship Summaries
- Radiation Exposure, Risk Assessment & Nuclear Support Services
- Risk Assessment
  - Consumer Products
  - Occupational Exposure Assessment
  - Probabilistic Risk Assessment
  - Site-Specific Risk Assessment
- Risk Communication

Risk Assessment

Overview

Risk assessment is a systematic approach to assessing the potential health risks associated with exposure to known or potentially toxic agents. Risk assessments can be used in a variety of contexts, including evaluating exposure to chemicals associated with consumer products, occupational settings, or specific contaminated sites. The scope of the risk assessment can be limited to single risk estimates, typically for a highly exposed individual within a population (deterministic risk assessment), or expanded to risk estimates across the full distribution of the exposed population (i.e., probabilistic risk assessment). Exponent scientists and engineers are highly knowledgeable in risk assessment methodologies and related analyses that are critical components of many environmental regulatory decisions and are frequently used in litigation.



Site-Specific Risk Assessment

Overview

Exponent uses a multidisciplinary approach in developing and evaluating site-specific risk assessments. Site-specific risk assessments are an appropriate scientific tool for evaluation of the health risk posed by sites and circumstances that involve possible exposures to known or potentially toxic agents. The elements of a site-specific risk assessment include site characterization and data evaluation, exposure assessment, dose-response evaluations (toxicology), and risk characterization. Using well-established scientific principles along with innovative approaches, our uniquely qualified team of professionals can investigate and provide a detailed assessment of risks to both onsite and offsite receptors.

Regulatory agencies routinely use the results of site-specific risk assessments as the primary bases for decision-making at contaminated sites. The results of a site-specific risk assessment can help determine the need for and nature of remedial actions at hazardous waste sites, support the derivation of cleanup levels, and assist in permitting new facilities and developing closure plans for solid waste management units and facilities that are going out of service. At Exponent, our scientists and engineers perform and critique site-specific risk assessments and derive risk-based remediation goals for hazardous waste sites and facilities under a variety of federal and state regulatory frameworks.

We also perform these services for clients acting voluntarily to address sites not governed by any regulatory mandate. These risk analyses can be a powerful tool in assessing potential environmental liabilities and managing an inventory of sites. Our risk assessors have applied their expertise to perform site-specific analyses and assist our clients in developing effective strategies for managing hundreds of sites.

Our services include:

- Data evaluation
- Bioavailability studies
- Fish consumption surveys and studies
- Toxicity assessments
- Chemical Fate and Transport modeling
- Emissions characterization
- Air dispersion modeling
- Characterization of exposed populations
- Screening-level risk evaluations
- Comprehensive baseline risk assessments
- Sensitivity analysis
- Derivation of risk-based cleanup levels
- Deterministic and probabilistic exposure assessments
- Research and development to address sources of uncertainty
- Risk communication in public forums, seminars, and presentations
- Expert/consulting-level support for toxic tort, class action, and general litigation

The assessment of exposure in site-specific risk assessments has taken an increasingly important role, and sophisticated methods are being applied to improve exposure estimates, thus reducing uncertainty in risk estimates. Our professionals are leaders in the exposure assessment field. The Center for Exposure and Dose Reconstruction specializes in exposure assessment, a stage in the risk assessment process that often represents a key source of uncertainty in the risk outcome. We can perform exposure assessments involving any contaminant and all media to which an individual can be exposed, including soil, indoor dust, drinking water, surface water, outdoor and indoor air (including vapor intrusion), contact with residues on surfaces, locally-grown fruits, vegetables, meat, dairy or egg products, and breast milk. We are involved in the leading exposure assessment scientific societies and have made numerous contributions to the scientific literature in the field of exposure assessment.

Several software packages have been developed that can greatly aid in the computational aspects of risk assessment. Exponent scientists are familiar with EPA and commerically-available software packages and, when necessary, have developed our own site-specific analysis systems. This experience gives us an unparalled knowledge of the underlying theory, limitations, and sensitivity of risk assessment methodologies.

As necessary, this work is done in concert with evaluations performed by other Exponent scientists and engineers. Our analyses support assessment of appropriate and cost-effective remedial strategies for specific sites and provide critical documentation for site administrative records.

We effectively communicate our approaches and results to industry, regulatory personnel, and the public. Our presentations at national and international meetings, and our published research papers and articles in the peer-reviewed literature, cover many of these issues. These efforts have earned us a well-established scientific reputation and lend greater credibility to our assessments.