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Elizabeth T. Lu, P.E.
Senior Managing Engineer

Professional Profile

Ms. Elizabeth Lu is a Senior Managing Engineer in Exponent's Health Sciences Center for Exposure Assessment and Dose Reconstruction. She has 16 years of experience in loss management/prevention, environmental and safety compliance, environmental site remediation and risk communication for private industry clients. Most recently, Ms. Lu has spent several years on assignment as an in-house project manager for a major oil company where she has implemented corporate programs ranging from global deployment of a behavior-based loss prevention system to improvement on an existing compliance program for U.S. retail stations and terminal facilities. Her responsibilities have included strategy planning, evaluating existing programs, mentoring client staff, facilitating meetings, and developing communications to help improve workforce understanding and planning for impending changes.

At Exponent, Ms. Lu has applied her management skills to integrating work products from multidisciplinary team members for large-scale projects. Ms. Lu has also applied her technical research skills in performing consulting work in the fields of occupational and environmental health. Examples of such consulting work include: analysis of work-related injury trends, assessment of public health risks during electric power outages, and evaluation of asbestos and mold exposures.

Prior to joining Exponent, Ms. Lu was a Senior Engineer at Geomatrix Consultants in Oakland, California, where she was responsible for the development/design and implementation of environmental investigations and remediation systems. She applied her knowledge of environmental forensics, risk-based decision-making, regulatory compliance and her understanding of clients' business goals to bring together landowners, developers, construction crews, and the regulatory community to prioritize health and safety risks and resolve environmental and public health issues in a cost-effective and timely manner.

Academic Credentials and Professional Honors

M.S., Geotechnical Engineering, University of California at Berkeley, 1993
B.S., Civil Engineering, University of California at Berkeley, 1990

Licenses and Certifications

Registered Civil Engineer, California #C52522

Publications

Kelsh MA, Fordyce TA, Lau EC, Mink PJ, Morimoto LM, Lu ET, Yager JW. Factors that distinguish serious versus less severe strain and sprain injuries: An analysis of electric utility workers. *Am J Ind Med* 2009; 52:210–220.

Fordyce TA, Kelsh MA, Lu E, Sahl JD, Yager JW. Thermal burn and electric shock injuries among electric utility workers 1995–2004. *Burns* 2007; 33:209–220.

Hicks JB, Lu ET, De Guzman R, Weingart M. Fungal types and concentrations from settled dust in normal residences. *J Occup Environ Hyg* 2005; 2:481–492.

Kelsh MA, Lu ET, Ramachandran K, Jesser C, Fordyce T, Yager JW. Occupational injury surveillance among electric utility employees. *J Occup Environ Med* 2004; 46:974–984.

Paustenbach DJ, Finley BL, Lu ET, Brorby GP, Sheehan PJ. Environmental and occupational health hazards associated with the presence of asbestos in brake linings and pads (1900 to present): A “State-of-the-Art” review. *J Toxicol Environ Health (Part B)* 2004; 7:33–110.

Park G, Lu E, Lester M, Pye J, Sullivan R, Riccio G. Technology survey and assessment for the U.S. Army’s Objective Force Warrior Program. Published in *Proc. 8th Annual International Conference on Industrial Engineering, Theory, Applications, and Practice*. Las Vegas, NV, November 10–12, 2003.

Presentations

Hicks JB, Lu ET. Culturable fungi in settled dust from normal residences. Presented at the 2005 American Industrial Hygiene Conference and Exposition, Anaheim, CA, May 21–26, 2005.

Kelsh MA, Lu ET, Fordyce T. EPRI Occupational health and safety database (OHSD): Update of ongoing 2004 activities. Invited presentation at EPRI Occupational Health and Safety Area Council Meeting, Boston, MA, September 30, 2004.

Kelsh MA, Lu ET, Ramachandran K, Jesser C, Fordyce T, Yager JW. Occupational injury surveillance among electric utility employees. Poster presentation at the 37th Annual Meeting of the Society for Epidemiologic Research, Salt Lake City, UT, June 15–18, 2004.

Sheehan, P.J., Finley BL, Lu ET, Brorby GP. Environmental and occupational health hazards associated with the presence of asbestos in brake linings and pads (1900 to present). Invited presentation at the Society of Automotive Engineers (SAE), 21st Annual Brake Colloquium and Exhibition, Hollywood, FL, October 19–21, 2003, and at the SAE 2004 World Congress, Detroit, MI, March 8–11, 2004.

Prior Experience

Senior Engineer, Geomatrix Consultants, Inc., 1991–2000

Project Experience

Loss Management/Prevention

Currently, project manager for a major oil company responsible for the global deployment of Loss Prevention System™, a behavior-based system to prevent and reduce losses, to the entire downstream workforce in over 100 countries. Responsibilities on this change management project include the following: ensuring training is delivered project personnel in a standardized format, and completed on schedule and within budget; creating tools to monitor and improve team performance; managing communications; verifying that project training materials are integrated with that produced by other ongoing corporate initiatives; and serving as the liaison between the project team and internal IT team responsible for making the data capture application used in conjunction with the Loss Prevention System™ available to personnel in all regions where the company operates.

Managed and facilitated on behalf of a major oil company an initiative to implement innovative strategies and achieve significant project/site cost breakthrough opportunities for highly complex environmental projects within the Refining business. Objectives include assisting project teams in overcoming impediments to project/site progress; identifying, supplying, and/or funding additional resources as necessary. Worked with client to match internal personnel with program needs. In its first year, the team spent ~\$600,000, but saved the division \$6 million.

Managed projects for a major oil company that were along a former crude oil pipeline right-of-way. Responsibilities included leading a team of five technical staff members in evaluating data to identify regulatory requirements and estimate the client's potential liability, negotiating with regulatory agencies (California Department of Toxic Substances Control, San Joaquin County Public Health Services, Contra Costa County Health Services Department, and the California Regional Water Quality Control Board—Central Valley Region) to implement risk-based corrective action, coordinating and overseeing environmental consulting services, and handling community relations. Successfully obtained 11 regulatory closure letters in three years, allowing third parties to develop contaminated properties and thereby mitigating lawsuit potential from third parties. Prepared and implemented post-remediation management plans regarding handling impacted soils and groundwater encountered during construction activities. This protocol was also applied to residential developments. Served as a member of a client's high-level decision analysis study team that evaluated the business strategy implemented on this \$2 million/year environmental program. Two example projects are described below.

- Minimized client's financial and public relations risk from unanticipated delays resulting from environmental issues encountered at three different construction sites. Saved client more than \$1.2 million, averted litigation between client and third parties, created goodwill among developers, construction crews, and client, and successfully negotiated minimal involvement by the governing regulatory agencies.

- Managed the work conducted at a migrant farm worker facility that was closed because of petroleum hydrocarbon contamination, and was responsible for regulatory agency interactions and community relations. Regulatory closure was obtained on a fast-track 10-month schedule, which resulted in the reopening of the facility, goodwill among all parties involved (including the workers who were living on the facility), and a 75-percent reduction of the original settlement request.

Assisted the California Public Utilities Commission (PUC) in a large-scale evaluation of the relative public health and safety risks of more than 9,000 businesses seeking an exemption from rotating power outages in California. Specifically, worked with the PUC in the development and implementation of a web-based application and a risk-based decision model to generate a numerical risk score and qualitative modifying factors for each applicant. These data were used in conjunction with a load analysis to develop a prioritized list of applicants based on critical public health and safety needs.

Environmental Safety and Compliance

Served as in-house project manager for a major oil company, and was responsible for a \$350,000+ program to improve environmental health and safety compliance at more than 40 bulk terminal facilities and 500+ service stations located in 17 states. Tasks included identifying and prioritizing gaps in the existing compliance program, soliciting input from stakeholders, identifying applicable best practices from other operating companies within the client organization, managing the development and implementation of a user-friendly database of pertinent regulatory and company policy information that tied into pre-existing platforms (SAP-PM), overseeing a 12+ member contractor team, and coordinating a training workshop for the 30+ users of the database.

Performed an assessment of environmental regulations in 43 countries across North America, Europe, and Asia on batteries, heavy metals/toxic material content, and recycling/recovery/end-of-life disposal requirements. The survey was conducted to identify existing and/or proposed regulations that potentially impacted the client's products, including documentation requirements for instruction sheets/product manuals, packaging, and labeling requirements, and information on available collection/recycling organizations and companies. Work product served as a baseline for the client in tracking battery-related regulations affecting product distribution.

Performed several Phase I site assessments for various property transactions. These included properties designated for office buildings in large commercial parks, retail stores in industrial and commercial settings, and a 30-mile pipeline used for transporting treated wastewater. Site assessment activities included reconnoitering sites and surrounding areas to identify potential environmental concerns, reviewing historical documents and regulatory agency files, and preparing reports documenting work.

Occupational and Environmental Health

Served as a team member in asbestos friction material litigation project involving claims that auto/brake mechanics were exposed to asbestos during repair of asbestos-containing brake linings and pads. Responsibilities included conducting and preparing a review of when asbestos-related diseases were recognized in workers engaged in manufacturing friction products and installing and repairing brake linings/pads, and describing how concerns for associated occupational hazards were balanced with vehicle performance and safety requirements and the resulting federal and state regulatory actions. Prepared the exhibits and materials used by brake experts for litigation cases.

Managed project where client requested an evaluation of the potential human health effects associated with the presence of stainless steel particles in food/beverage products, as well as identification of the root cause of the presence of the stainless steel particles. Results of the human health evaluation were used by the client to successfully negotiate that a product recall by FDA was not necessary and that there were no significant risks to human health.

Identified and evaluated injury and illness trends based on data in a standardized occupational health surveillance database that was established by EPRI, formerly known as the Electric Power Research Institute, for the electric utility workforce. Responsibilities also included recruiting utilities to participate in the surveillance project and preparing the annual report. Conducted a nested case-control to identify what factors are associated with serious sprain/strain injuries versus less severe (i.e., non-lost time) sprain/strain injuries.

Conducted an exposure assessment study of background fungi levels in settled dust from carpeting and furnishings in 26 normal residences (i.e., not mold impacted). These residences were pre-screened by interviews with the owners, physical inspection, and air sampling to limit the surface dust collection to structures in which there was no history of water intrusion, flooding, plumbing leaks, signs of mold growth, or evidence of unusual airborne fungal spore types or concentrations.

Environmental Site Remediation

For a former metals recycling facility in Santa Rosa, California, prepared a feasibility study developed in accordance with National Contingency Plan requirements by comparing various remediation technologies and developing conceptual engineering designs, design-life cost estimates, and implementation schedules. Oversaw construction of a groundwater treatment system designed to remediate volatile organic compounds at the former metals recycling facility. Provided ongoing operations and maintenance support, including monitoring and sampling program coordination, system performance tracking/optimization, maintenance team training, monitoring of analytical data, regulatory compliance reporting, and implementation of preventive maintenance tasks.

Prepared the engineering design and contract drawings, specifications, and bid documents for a groundwater/soil vapor extraction treatment system at a former chemical solvent repackaging facility in Santa Fe Springs, California. Designed and supervised the construction and operation

of a temporary groundwater treatment system using activated carbon at the site. Prepared Negative Declaration application and public notice of the project work in compliance with requirements of the California Environmental Quality Act.

Prepared the work plan for a former industrial site in San Jose, California, and implemented the remediation plan, which included excavating and backfilling a 3,500-yd³ pit, testing the density of backfill material, and characterizing excavated soil for disposal. Oversaw remediation and disposal activities at the site. Prepared the remedial action report.

Operated and maintained a groundwater treatment system at an active industrial research facility in Palo Alto, California. Designed and supervised modifications to an existing groundwater treatment system that could not be shut down temporarily for construction activities.

Supervised construction of a groundwater and soil vapor extraction system at a former semiconductor manufacturing facility in Cupertino, California.

For a former automobile assembly plant facility, prepared the closure report and site management plan. Closure was granted by the California Regional Water Quality Control Board, San Francisco Bay region.

Technology Development

Served as a key project team member for Exponent during its participation in Phase 1 of the U.S. Army's Objective Force Warrior project (now known as Future Force Warrior), the Army's flagship science and technology initiative to create a lightweight and overwhelmingly lethal, fully-integrated combat system, including head-to-toe individual protection, ad-hoc networking, soldier-worn power sources, and enhanced human performance. Responsibilities included managing work products from multidisciplinary team members both within Exponent and among its partner companies to produce the risk strategy, risk management plan, technology assessment, technology investment, and tradeoff assessment deliverables.

Professional Affiliations

- American Society of Civil Engineers
- American Association for the Advancement of Science