

**Kristin R. Robrock, Ph.D., P.E.**  
**Senior Engineer**

**Professional Profile**

Dr. Kristin Robrock is a Senior Engineer in Exponent's Environmental Sciences practice. She is an environmental engineer and microbiologist who specializes in biodegradation and the fate of chemicals in the environment. She focuses on emerging contaminants, chlorinated solvents, *in-situ* bioremediation, and analytical chemistry. During her Ph.D. work, Dr. Robrock studied the degradation of the flame retardants polybrominated diphenyl ethers (PBDEs) by aerobic and anaerobic bacteria and delineated the degradation pathways and determined the conditions necessary for these biological processes to occur. She also has extensive experience working with PCE, TCE, 1,4-dioxane, and the personal care product Triclosan.

Before entering graduate school, Dr. Robrock worked for Hart Crowser, Inc., where she assisted with a dredging project involving the removal of PCB-contaminated sediment. She has also been a teaching assistant for an undergraduate-level environmental engineering course and a graduate-level environmental biological processes course.

**Academic Credentials and Professional Honors**

Ph.D., Environmental Engineering, University of California, Berkeley, 2008

M.S., Environmental Engineering, University of California, Berkeley, 2003

B.S., Earth and Environmental Engineering, Columbia University, 2001

Tien Scholar for Environmental Science and Biodiversity

University of California Toxic Substances Research and Teaching Program Fellowship

Civil and Environmental Engineering Graduate Student Fellowship

Tau Beta Pi Honor Society

**Licenses and Certifications**

Registered Professional Civil Engineer, California, #77047

**Languages**

Italian, French

## Publications

Robrock KR, Coelhan M, Sedlak DL, Alvarez-Cohen L. Biodegradation of polybrominated diphenyl ethers by aerobic bacteria. *Environ Sci Technol* 2009; 43(15):5705–5711.

Zeng X, Robrock KR, Simonich SL, Alvarez-Cohen L, Korytár P, Barofsky DF. Application of a congener specific degradation model to study photodegradation, anaerobic biodegradation, and Fe<sup>0</sup> reduction of polybrominated diphenyl ethers. *Environ Toxicol Chem* 2009; 29(40):770–778.

Zeng X, Simonich SL, Robrock KR, Korytár P, Alvarez-Cohen L, Barofsky DF. Development and validation of a congener specific photodegradation model for PBDEs. *Environ Toxicol Chem* 2008, 27(12): 2427–2435.

Robrock K.R., Korytar P., Alvarez-Cohen L. Pathways for the anaerobic microbial debromination of polybrominated diphenyl ethers. *Environ Sci Technol* 2007, 42(8):2845–2852.

He J, Robrock KR, Alvarez-Cohen L. Microbial reductive debromination of polybrominated diphenyl ethers (PBDEs). *Environ Sci Technol* 2006; 40(14):4429–4434.

## Presentations

Robrock KR. Biotransformation of polybrominated diphenyl ethers by aerobic bacteria. IWA/GRA Micropol & Ecohazard, San Francisco, CA, June 2009.

Robrock KR. Aerobic biodegradation of polybrominated diphenyl ethers (PBDEs) by PCB-degrading bacteria. Norcal SETAC Conference, Berkeley, CA, May 2008.

Robrock K, Alvarez-Cohen L. Degradation of polybrominated diphenyl ethers by aerobic PCB-degrading organisms. Poster presentation, NIEHS Superfund Basic Research Program Meeting, Durham, NC, 2007.

Robrock KR. Biodegradation of polybrominated diphenyl ethers. California Water Environment Association Student Night, Oakland, CA, March 2007.

Robrock KR, Korytar P, Alvarez-Cohen L. Anaerobic microbial degradation pathways for seven environmentally relevant PBDE congeners. Poster presentation, 107<sup>th</sup> General Meeting for the American Society for Microbiology, Toronto, Canada, 2007.

Robrock KR, He J, Korytar P, de Boer J, Alvarez-Cohen L. Degradation of polybrominated diphenyl ethers (PBDEs) by *Dehalococcoides* species. Poster presentation, Groundwater Resources Association Emerging Contaminants in Groundwater, Concord, CA, 2006.

Robrock KR. Anaerobic microbial debromination of polybrominated diphenyl ethers. Association for Environmental Health and Sciences West Coast Conference, San Diego, CA, March 2006.

Robrock KR, He J, Korytar P, de Boer J, Alvarez-Cohen L. Degradation of polybrominated diphenyl ethers by *Dehalococcoides* species. Poster presentation, 106th General Meeting of American Society for Microbiology, Orlando, FL, 2006.

Robrock KR. Anaerobic microbial debromination of polybrominated diphenyl ethers. Dioxin 2005 Conference, Toronto, Canada, August 2005.

## **Peer Reviewer**

*Environmental Science and Technology*

## **Project Experience**

### ***Environmental Engineering***

Investigated the sources of heavy metals for an urban lake contaminated with lead and other metals. Quantified the amount of lead present in the lake and yearly depositional patterns. Calculated the lead contamination from direct urban runoff and aerial deposition from an adjacent roadway from historical and present automobile use. Investigated other potential sources of lead from nearby residential, military, and industrial uses, and determined the total lead input from all sources of runoff in the watershed.

Oversaw daily dredging activities of PCB-contaminated sediment in a ship-loading channel in New York harbor for a metal recycling facility. The sediment was chemically stabilized and used for an experimental project involving stabilization of mining-impacted hillsides in Pennsylvania. Oversaw construction of a golf course on a brownfield using the stabilized sediment. Handled an extension of the dredging permit and performed field sampling. Assisted with design of the dredged channel.

Investigated sources of heavy metals, particularly copper, nickel and zinc, at a ship building facility to assist with NPDES compliance for water discharged to the San Diego Bay from the graving dock. Determined quantities of heavy metals in the storm water drainage system at the site draining to the graving dock. Conducted water sampling to determine rates of heavy metal leaching from ship hulls and other surfaces in the graving dock. Assisted with creation of a water quality model to compare predicted copper loadings into the graving dock with actual measured quantities. Based on modeling results, determined the most important sources of copper to the graving dock. Determined several readily-implementable recommendations for the ship builder to reduce copper loadings to achieve compliance with NPDES permit requirements.

Analyzed contamination scenarios for PCE in dry cleaning facilities, determining the quantities of PCE that could be released to sewers from various disposal methods. Quantified potential

releases to the subsurface through leaking sewer pipes.

Investigated causes of flooding at a residential development from a stormwater system consisting of an underground stormwater sewer and a natural drainage channel. Oversaw topographic surveying and sewer surveying. Developed hydraulic grade lines and calculated volume of sediment to be removed to restore conveyance of stormwater through the channel.

Conducted a cost estimate for remediation of a PCE plume at a dry cleaner facility in Oakland. Analyzed data to determine extent of contamination and possible remediation strategies.

Evaluated investigation and remediation activities for a perchlorate groundwater plume for a CERCLA cost recovery litigation. Evaluated investigations, remedial activities and removal actions conducted at the site for compliance with NCP. Determined costs associated with past environmental investigation and remedial activities.

Oversaw vacuum dust sampling in homes for dioxin contamination of residential dust.

Devised a sampling plan and conducted sampling of a hydrocarbon sheen on an urban estuary using a sheen-specific Teflon® net sampling device. Oversaw chemical fingerprinting of the collected sheen for source identification.

Devised a sampling plan and conducted sampling of hydraulic fluids in 55-gallon drums for chromium, dioxins and VOCs from a former metal-plating facility.

### ***Microbiology***

Compiled anaerobic biodegradation rates for a cap design of contaminated lake sediments, and calculated the range of expected half-lives. The contaminants of interest included BTEX, PAHs, chlorinated benzenes, phenol, and PCBs.

Conducted a literature review of bacteria associated with foot odors in healthy people for an FDA 510K submission for anti-embolism stockings treated with the antimicrobial triclosan. Devised a testing protocol for determining the antimicrobial effectiveness of the stockings against appropriate odor-causing foot bacteria. Oversaw antimicrobial testing of stockings and determined appropriate odorous chemicals to analyze during a sniff test.