

LeeAnn Racz, Ph.D., P.E., C.I.H., B.C.E.E.

SENIOR ENGINEER I

CONTACT INFORMATION

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PROFESSIONAL PROFILE

Dr. LeeAnn Racz is a Board-Certified Environmental Engineer and Certified Industrial Hygienist and a member of ToxStrategies' Exposure Sciences Practice. With a background in environmental health and workplace exposure assessment, Dr. Racz completed a 23-year career with the U.S. Air Force before entering the consulting arena. She is a subject-matter expert in environmental health risk assessment, industrial hygiene, environmental engineering, and drinking-water and wastewater evaluation and protection. She has led a large group of health professionals and commanded a medical readiness squadron during a military career that spanned eight Air Force bases across the US, in South Korea, and in the UK.

Dr. Racz has assembled and led numerous teams in areas that include industrial hygiene and environmental compliance education, emergency response readiness, industrial hygiene research, response and recovery at aircraft crash and other accident sites, noise sampling and analysis, aerospace medicine services, and optimization of medical readiness. She has also directed radiation safety programs and managed radiation surveys. As a consultant, Dr. Racz has worked with a global manufacturing company (17 locations) to develop and implement pandemic protective measures. She has also supported program management and published technical handbooks on environmental and occupational health.

Dr. Racz is an adjunct faculty member with the Air Force Institute of Technology (Graduate School of Engineering and Management) and serves as an ABET (formerly, Accreditation Board for Engineering and Technology) Program Evaluator in environmental engineering. She is an editor of six technical handbooks, author of eleven peer-reviewed scientific publications and five other technical papers, and she has presented at more than 30 scientific conferences.

EDUCATION AND DEGREES EARNED

- 2010 Doctor of Philosophy, Environmental Engineering
University of Utah
- 2004 Master of Science, Biological and Agricultural Engineering
University of Idaho
- 1996 Bachelor of Science, Environmental Engineering
California Polytechnic State University, San Luis Obispo

CERTIFICATIONS

- Board-Certified Environmental Engineer, #13-20014, Awarded 2013
- Certified Industrial Hygienist, #10284, Awarded 2013
- Professional Engineer
 - Colorado #39374, Awarded 2005
 - Florida #PE89801, Awarded 2020
- Lean/Six Sigma Green Belt, Awarded 2017

PROFESSIONAL ASSOCIATIONS

- American Academy of Environmental Engineers and Scientists

SELECTED PROFESSIONAL EXPERIENCE

Industrial Hygiene

Led and conducted qualitative comprehensive industrial hygiene assessment for polyethylene piping manufacturer.

Advised a global manufacturing company with worldwide plant operations on how to safely do business during the COVID-19 pandemic. Recommended specific engineering and administrative controls to keep employees healthy and productive, such as screening procedures, ventilation adjustments, and cleaning protocols.

Provided consultation on the “office of the future” to enable flexibility in work/life balance and better quality of work and personal life.

Led 50 environmental and occupational health professionals in providing exposure assessment and mitigation guidance to 684,000 personnel at 176 installations across the globe.

Led 55 personnel in ensuring the environmental and occupational health at 20 locations in three countries. Oversaw full spectrum of chemical, biological, noise, radiation, ergonomic, and other hazard assessments and controls. Implemented workplace hazard identification, prioritization, and control processes.

Developed protocol for determining impact noise hearing protection device requirements. Eliminated 21-month backlog of high-risk evaluations for 35 military bases.

Oversaw two laser committees and established incident reporting protocols.

Led Broken Arrow nuclear incident response teams, earning a positive evaluation from the Department of Energy.

Supervised radiation safety at 20 federal locations. Oversaw radioactive material storage, shipment, and handling procedures, as well as permits.

Implemented protocol for novel isocyanate sampling method. Established benchmark for US Air Force procedures.

Performed formaldehyde air sampling of medical students during cadaver work. Implemented specialized engineering ventilation controls to protect faculty and students.

Designed and implemented in-depth evaluation of 100 base radiofrequency radiation emitters.

Established base radon working group and developed exposure mitigation plan.

Directed comprehensive respiratory protection programs at seven bases, including fit testing, worker training, medical clearance, and worker tracking, to ensure worker safety.

Identified data gaps in radiofrequency radiation program at phased array radar site in Greenland. Performed in-depth exposure survey and advised on protective measures.

Conducted comprehensive early-warning radar system radiation evaluation.

Surveyed and developed disposal plan for 12,000 radioactive material items.

Risk Assessment

Evaluated risks of human and environmental overexposures to poly- and perfluoroalkyl substances (PFAS) from legacy contamination and ongoing chemical usage.

Advised on scientific basis and suitability of PFAS exposure standards.

Performed emergency release exposure modeling for industrial operations.

Conducted exposure modeling for Proposition 65 chemicals. Determined allowable exposures for compliance with regulations.

Coordinated response, cleanup, and corrective actions for widespread hexavalent chromium contamination in aircraft maintenance facility.

Directed investigation into aircraft crew toluene exposure in emergency air tanks. Rapidly implemented novel use of air monitoring equipment to maintain flying operations.

Oversaw legacy radiation surveys for three major federal bases. Evaluated risks from environmental contamination.

Protected response and recovery personnel at two major aircraft crashes by directing environmental and health-and-safety teams. Advised on measures to protect personnel and property.

Managed water lead sampling for three schools. Implemented risk mitigation and advised parents and teachers on overexposure risks and corrective actions.

Guided high-visibility asbestos spill response and recovery plan. Coordinated extensive sampling plan and advised on risks and cleanup.

Instituted Ebola containment measures at two overseas locations.

Directed research into hyperspectral imaging for rapid chemical contamination in buildings.

Established research into chemical warfare agent contamination on drinking-water infrastructure using malathion as a surrogate. Evaluated chemical interactions with pipe materials.

Performed toxic industrial material vulnerability assessments at six federal bases. Identified hazards and implemented measures to reduce risk.

Directed stadium sweeps and standby response teams for high-visibility US Air Force Academy events.

Led chemical storage ventilation study. Found design error and advised on corrections for safe storage of 10,000 chemicals.

Designed and executed airborne particulate study during hospital renovations. Ensured particulate controls in sensitive eye surgery areas.

Developed first-responder pilot programs at four bases; called “best program in Department of Defense.”

Led response to tear gas powder attack on federal site. Coordinated with law enforcement to identify agent and advised on protective measures.

Oversaw responses and cleanup actions for mercury, fuel, organic solvent, suspicious white powders, and other hazardous material spills.

Evaluated indoor air quality complaints in office buildings and athletic facilities. Surveyed ventilation systems and possible sources of hazardous agents.

Environmental Assessment

Directed research on cryomilled tire tread extraction and leachate analysis.

Developed a state-of-knowledge report on brake-wear particle generation, testing methods, environmental contamination, and human health effects.

Advised on the state of the science on environmental factors related to cyanotoxin production.

Oversaw drinking-water sampling and analysis programs at four federal locations, including publishing Consumer Confidence Reports. State regulators called drinking-water program “Gold Standard.”

Directed US Air Force drinking-water data gap analysis. Established tools to streamline reporting processes.

Managed water vulnerability assessments at 10 federal bases. Identified threats to water quality and coordinated mitigation actions.

Developed novel ultraviolet light emitting diode reactor for drinking-water treatment.

Evaluated biological treatment capabilities and bacterial metabolic pathways of malathion and propylene glycol.

Developed new sampling and analysis protocol for quantifying estrogens and other chemicals in activated sludge, which accounted for biological degradation and physical sorption.

Discovered effect of differing carbon sources on ammonia-oxidizing bacteria in a mixed culture.

Educated Utah wastewater professionals on implications of nanoparticles in wastewater.

Researched seasonal variation effect on bacterial ecology at full-scale wastewater treatment plants.

Oversaw renovations at two swimming pools to fix 20-year problem. The diving coach praised the resulting water chemistry as “best ever.”

Identified and coordinated solution for silver recovery sampling discrepancy in a hospital.

Directed internal and external environmental compliance audits at five bases across the US and South Korea. Corrected longstanding deficiencies and identified best practices.

Updated base Hazardous Waste Management Plan and Spill Plan to streamline response procedures and more effectively protect human health and the environment.

Performed area air sampling and air emissions inventories and prepared Clean Air Act Title V permit applications for landfills and wastewater treatment facilities.

Education, Training, and Organizational Leadership

Chaired a session at the 43rd annual meeting of the Society of Environmental Toxicology and Chemistry (SETAC): “Improving Community Exposure Assessment Using Personal and Local Monitors.”

Received Professional Certificate, Architecture and Systems Engineering: Models and Methods to Manage Complex Systems, Massachusetts Institute of Technology

Established installation Human Performance Working Group that resolved long-standing and emerging concerns on physiological stressors in five operational organizations.

Led 165 personnel in delivering primary and preventive aerospace medicine services to 8900 members at most deployed base in US Air Force.

Directed emergency response training event for multi-team response to chemical spills and established decontamination standards.

Led 27 faculty and staff in providing graduate education to 200 students.

Promoted success of 700 students by establishing Dean’s advisory board.

Organized two international symposia on chemical, biological, radiological, and nuclear research and response.

Designed and delivered three-day course for 13 bases in use of chemical, biological, and radiological defense equipment.

Built comprehensive proficiency testing plan in 13 response equipment items for 800 personnel.

Ensured mission readiness of 1,615 personnel by leading team of eight in providing 2,600 hours of instruction in exposure assessments, industrial hygiene, and environmental compliance.

Oversaw 18 instructors in streamlining and updating emergency response course.

Tested capabilities of nine emergency response teams as lead architect of first US Air Force competition.

Guided development of four-day radiofrequency radiation course and safe use of active denial system.

PUBLISHED ARTICLES

Verwiel A, **Racz L**, Mittal L, Rish W. 2022. CDC's national report on human exposure to environmental chemicals. SETAC Globe 23(6); available at: https://globe.setag.org/cdc_report_human_exposure_to_chemicals/.

Racz L, Rish W. 2021. Exposure monitoring toward environmental justice. Integ Environ Assess Manag 00:1–5; available at: <https://doi.org/10.1002/ieam.4534>.

Badiru AB, **Racz L**, Grinston RL. 2016. Coordinated maintenance. Indust Eng Mag 48(1):46–49.

Duckworth K, Spencer M, Bates C, Almquist C, Grimaila M, Magnuson M, Willison S, Phillips R, **Racz L**, Miller M. 2015. Advanced oxidation degradation kinetics as a function of ultraviolet LED duty cycle. Water Sci Technol 71(9):1375–1381.

Tran T, **Racz L**, Grimaila MR, Miller M, Harper WF Jr. 2014. Comparison of continuous versus pulsed ultraviolet light emitting diode use for the inactivation of *Bacillus globigii* spores. Water Sci Technol 70(9):1473–1480.

King ST, Sylvander M, Kheperu M, **Racz L**, Harper WF. 2014. Detecting recalcitrant organic chemicals in water with microbial fuel cells and artificial neural networks, Sci Tot Environ 497–498:527–533.

Delorit JD, **Racz L**. 2014. Evaluation of activated sludge for biodegradation of propylene glycol as an aircraft deicing fluid. Water Environ Res 86(4):366–371.

Janeczko AK, Walters EB, Schuldt SJ, Magnuson ML, Willison SW, Brown LM, Ruiz ON, Felker DL, **Racz L**. 2014. Fate of malathion and a phosphonic acid in activated sludge with varying solids retention times. Water Res 57:127–139.

Flory J, Kanel SR, **Racz L**, Impellitteri CA, Rendahandi GS, Goltz MN. 2013. Influence of pH on the transport of silver nanoparticles in saturated porous media: laboratory experiments and modeling. J Nanopart Res 15(3):2–11.

Schuldt S, Walters E, Janeczko A, Magnuson M, Willison S, **Racz L**. 2013. Fate of chemical warfare agents in wastewater treatment biomass. CBRNe World, February.

Racz L, Baker PA, Duckworth KL, Heline TR, Woodall BD. 2013. Environmental planning while deployed: Mission hindrance or enhancement? Joint Force Quarterly 70:30–33.

Racz L, Muller JG, Goel RK. 2012. Fate of selected estrogens in two laboratory scale sequencing batch reactors fed with different organic carbon sources. Bioresource Technol 110:35–41.

Goltz MN, Kim DS, **Racz L**. 2011. Using nanotechnology to detect nerve agents. Air Space Power J 25(2):56–60.

Datta T, **Racz L**, Kotay SM, Goel R. 2011. Seasonal variations of nitrifying community in trickling filter-solids contact (TF/SC) activated sludge systems. Bioresource Technol 102(3):2272–2279.

Racz L, Datta T, Goel RK. 2010. Effect of organic carbon on ammonia oxidizing bacteria in a mixed culture. Bioresource Technol 101(16):6454–6460.

Racz L, Datta T, Goel RK. 2010. Organic carbon effect on nitrifying bacteria in a mixed culture. Water Sci Technol 61(11):2951–2956.

Racz L, Goel RK. 2010. Fate and removal of estrogens from municipal wastewater. J Environ Monit 12(1):58–70.

Racz L, Goel RK. 2010. Estrogens in wastewater: What happens to them and why do we care? Digested News, Summer.

BOOKS EDITED

Kempisty DM, **Racz L.** 2021. Forever Chemicals: Environmental, Economic, and Social Equity Concerns with PFAS in the Environment. Routledge, Taylor and Francis Group, ISBN 9780367456405.

Phillips K, Yamamoto DP, **Racz L.** 2020. Total Exposure Health: An Introduction. Taylor and Francis CRC Press, Boca Raton, FL.

Kempisty DM, Xing Y, **Racz L.** 2018. Perfluoroalkyl Substances in the Environment: Theory, Practice and Innovation. Taylor and Francis CRC Press, Boca Raton, FL.

Racz L, Eninger RM, Yamamoto DP. 2017. Handbook of Respiratory Protection: Safeguarding Against Current and Emerging Hazards. Taylor and Francis CRC Press, Boca Raton, FL.

Badiru AB, **Racz L.** 2015. Handbook of Measurements: Benchmarks for Systems Accuracy and Precision. Taylor and Francis CRC Press, Boca Raton, FL.

Badiru AB, **Racz L.** 2013. Handbook of Emergency Response: A Human Factors and Systems Engineering Approach. Taylor and Francis CRC Press, Boca Raton, FL.

PRESENTATIONS

Racz, L. PFAS: How did we get here and where are we going? Keynote address at Alliance of Hazardous Materials Professionals national meeting, Las Vegas, NV, Mar 2022.

Racz L, Embracing an agile and lean six sigma culture for worker health. Presented to Alliance of Hazardous Materials Professionals national meeting, Las Vegas, NV, Mar 2022.

Racz L, Rish W. Exposure monitoring toward environmental justice. Presented to SETAC (Society of Environmental Toxicology and Chemistry) 42nd Annual Meeting (virtual), Nov 2021.

Badiru AB, **Racz L.** Integrating systems thinking in interdisciplinary education programs: A systems integration approach. Podium presentation, American Society for Engineering Education, Salt Lake City, UT, Jun 2018.

Pham AT, Witter TM, **Racz L.** Royal Air Force Lakenheath health risk assessment process. Team Aerospace Operational Solutions Symposium, Tempe, AZ, Aug/Sep 2016.

Helene TR, Yamamoto DP, Felker DL, **Racz L**, Rubenstein MH. Field evaluation of solvent-free isocyanate sampling. Podium presentation and poster (2nd place winner in Health Risk Assessment: General category). Team Aerospace Operational Solutions Symposium, Tempe, AZ, Aug/Sep 2015.

Williams S, McDonough V, **Racz L.** Modeling work effectiveness of firefighters with varying shift schedules. Podium presentation, American Industrial Hygiene Conference and Exposition (AIHce 2015), Salt Lake City, UT, May/Jun 2015.

Spencer MJ, Miller ME, Richwine J, Duckworth KL, **Racz L**, Grimaila MR, Magnuson M, Willison S, Phillips R. Pulsed and continuous UV LED reactor for water treatment. International Ultraviolet Association Americas Regional Conference, White Plains, NY, Oct 2014.

Helene TR, Yamamoto DP, Felker DL, **Racz L**, Rubenstein MH. Field evaluation of solvent-free sampling with di-*n*-butylamine for the determination of airborne monomeric and oligomeric 1,6-hexamethylene diisocyanate. Poster, American Industrial Hygiene Conference and Exposition, San Antonio, TX, May/Jun 2014.

Magnuson M, Minamyser S, Clark S, Hall J, Szabo J, Vekhter EP, Pildus IE, Demenkova EA, James R, Hanft E, **Racz L**, Miller M, Grimaila M, Tran T, Duckworth K, Spencer M, Richwine J, Bates C. Selected on-going homeland security water and wastewater decontamination research projects. 2013 EPA International Decontamination Research and Development Conference, Research Triangle Park, NC, Nov 2013.

Racz L, Miller M, Grimaila M, Magnuson M, Willison S, Tran T, Duckworth K, Spencer M, Richwine J. Ultraviolet light emitting diode use in water disinfection. 2013 Pilot Research Project Symposium, Cincinnati, OH, Oct 2013.

Racz L, Harper WF, Miller M, Grimaila M, Magnuson M, Willison S, Tran T, Duckworth K, Spencer M, Richwine J. Ultraviolet light emitting diode use in water disinfection. Military Health Systems Research Symposium, Fort Lauderdale, FL, Aug 2013.

Racz L, Willison S, Magnuson M, Schuldt SJ, Walters E, Janeczko A. Fate of chemical warfare agents in municipal wastewater treatment systems. 245th ACS National Meeting, New Orleans, LA, April 2013.

Racz L, Willison S, Magnuson M, Schuldt SJ, Walters E, Janeczko A. Fate of organophosphorous chemical warfare agents in municipal wastewater treatment. 2013 CBRN Symposium, Air Force Institute of Technology, Wright-Patterson AFB, OH, Apr 2013.

Duckworth K, Tran T, Spencer M, Miller M, Grimaila M, **Racz L**. UV LED disinfection of water. 2013 CBRN Symposium, Air Force Institute of Technology, Wright-Patterson AFB, OH, Apr 2013.

Racz L, Walters E, Schuldt S, Janeczko A, Magnuson M, Willison S. Fate of chemical warfare agents in wastewater treatment biomass. Poster (won "Best Poster" award), CBRNe Convergence 2012, Norfolk, VA, Oct/Nov 2012.

Kanel SR, Dagher J, Meidinger T, Sizemore IE, **Racz L**, Impellitteri CA, Goltz MN. Fate and transport of silver nanoparticles and silver ions in saturated porous media: Laboratory experiments and modeling. 244th ACS National Meeting, Philadelphia, PA, 19-23 August 2012.

Willison S, **Racz L**, Schuldt SJ, Walters E. Fate of organophosphate chemical warfare agents (CWAs) in a municipal wastewater treatment system. American Water Works Association Annual Conference and Exposition, Dallas, TX, Jun 2012.

Flory JR, Kanel SR, **Racz L**, Impellitteri CA, Silva RG, Goltz MN. Influence of pH on the transport of silver nanoparticles in saturated porous media: Laboratory experiments and modeling. 86th ACS Colloid and Surface Science Symposium, Baltimore, MD, Jun 2012.

Kanel SR, Flory JR, **Racz L**, Goltz MN. Road towards sustainability: Understanding silver nanoparticle and silver ion transport in saturated media. American Society of Civil Engineers World Environmental and Water Resources Congress, Albuquerque, NM, May 2012.

Racz L. A systems approach to environmental studies. Industrial and Systems Engineering Research Conference (ISERC), Orlando, FL, May 2012.

Kanel SR, Flory J, **Racz L**, Impellitteri CA, Nadagouda M, Patterson C, Silva RG, Huang J, Goltz MN. Fate and transport of silver nanoparticles and related products in saturated porous media. Poster, 243rd ACS National Meeting, San Diego, CA, Mar 2012.

Racz L, Friend MA. Keeping graduate education relevant: Tying the Operational Air Force to the classroom. Air Education Training Command Symposium, San Antonio, TX, Jan 2012.

Flory J, Kanel SR, **Racz L**, Goltz MN. Transport of silver nanoparticles in saturated porous media: Experimental results and model simulations. Dayton Engineering Sciences Symposium, Fairborn, OH, Oct 2011.

Schuldt S, **Racz L**. Fate of chemical warfare agents in the environment. 4th CBRNE Research and Education Collaboration Symposium, Fairborn, OH, Sep 2011.

Flory J, Kanel SR, Dagher J, Pavel IE, **Racz L**, Huang J, Goltz MN. Transport of silver nano particles in saturated porous media and their prediction using mathematical model. Air Force Medical Service Medical Research Symposium, Washington, DC, Aug 2011.

Kanel SR, Dagher J, Flory J, Felker D, Pavel IE, **Racz L**, Huang J, Goltz MN. Fate and transport of silver nano particles in saturated porous media. Gordon Research Conference, Waterville Valley, NH, May/June 2011.

Racz L. Fate of chemical warfare agents in the environment. Third Annual CBRN Symposium, Air Force Institute of Technology, Wright-Patterson AFB, OH, Apr 2011.

Kanel SR, Flory J, Goltz MN, **Racz L**. Transport of engineered nanosilver particles in saturated porous media. 241st ACS National Meeting, Anaheim, CA, Mar 2011.

Racz L, Goel RK. Fate of selected estrogens in two laboratory scale sequencing batch reactors fed with different organic carbon sources. WEFTEC 2010 Proceedings, New Orleans, LA, Oct 2010.

Racz L, Goel RK. A systematic approach to evaluate the biodegradation kinetics of estrogens by nitrifying activated sludge. WEFTEC 2009 Proceedings, Orlando, FL, Oct 2009.

Racz L, Datta T, Kotay SM, Goel RK. Effect of carbon source on ammonia oxidizing bacteria community. 1st International Conference on Nitrification, Louisville, KY, Jul 2009.

Racz L, Goel RK. Comparison of estrogen degradation under various wastewater treatment schemes. 237th ACS National Meeting, Salt Lake City, UT, Mar 2009.