Marco Kaltofen, PhD, PE (Civil, MA), C. NSE

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Work Experience

President and Chief Scientist (1988-present) - Boston Chemical Data Corporation, Natick, MA
Investigate nuclear and chemical environmental fate and transport. Lead nuclear forensic investigations and environmental and public health investigations related to petrochemical, hazardous, and radioactive wastes.

- Onsite field sampling and management of investigations in the US and internationally
- Designed 100+ investigative projects responsive to specific public health concerns
- Managed scientific teams, consultants, vendor laboratories, multistate projects, and costs/budgets
- Expert scientific consultant and witness in 30+ federal, territorial, and state courts
- Modeling via computerized chemical, geographical and engineering information systems
- 3-D groundwater, air transport, fire dynamics, and human radiation dosimetry models
- Led major petrochemical plant facility inspections, including health & safety plans
- Lead scientist in more than $500 million in plaintiff settlements
- Science advisor to Havasupai, Yakima, San Ildefonso Pueblo and other indigenous tribal governments

Associate Research Engineer (2016-2020) - Nuclear Science and Engineering Program, Department of Physics, Worcester Polytechnic Institute, Worcester, MA

Mentored project-based learning experiences for undergraduate students in real-world research. Supervised student investigations into environmental radioactivity in Fukushima, Japan, and related sites; wildlife sample analyses from the Chernobyl Nuclear Power Station; and gamma-emitter mapping in Sellafield, Cumbria, UK.

Laboratory Director (1988-1993) - Citizens' Environmental Laboratory, Boston, MA

Founded this nationally recognized nonprofit environmental testing laboratory that served institutions, individuals, trade unions, and academic researchers. In four years, served over 750 clients and raised $1,000,000 in grants and contracts. Achieved a 100 percent success rate for trace metals, volatile organics, and PCBs on EPA performance evaluations. Oversaw staff health & safety, analyses, marketing, budgeting, hiring, public speaking, and expert testimony. Provided scientific communications with communities at contaminated sites.

Project Coordinator (1984-1988) - Greenpeace International, London, UK

Managed environmental program research and field sampling, supervision of fifty employees, media and community relations, operational safety, and field programs.

Trace Inorganics Laboratory Manager (1982 - 1984) - Cambridge Analytical Associates, Boston, MA

Oversaw atomic absorption, environmental, infrared, and polymer analyses. Supervised staff, client contacts, National Marine Fisheries Service contract, and USEPA performance evaluations.

Education

2007 to 2015 - Doctor of Philosophy degree in civil engineering, Worcester Polytechnic Institute, Dept. of Civil and Environmental Engineering, and nuclear science and engineering graduate certificate. Dissertation: Assessing human exposure to contaminants in house dust. Research in environmental transport of radioactive materials, particulate transport, and dynamic modeling and numerical analysis. Transport and physical properties of radioactively hot particles. Research on depleted uranium in the environment in Belgrade, Serbia supported by a grant from Jeff Ubois and the John D. and Catherine T. MacArthur Foundation.

2009 - Master of Science degree in Environmental Engineering, Worcester Polytechnic Institute, Dept. of Civil and Environmental Engineering. Coursework in environmental fate and transport, nuclear reactor operations, airborne radionuclide transport and radionuclide sampling heterogeneity, industrial waste treatment, atomic force microscopy, sustainable engineering, nuclear engineering, health physics, and groundwater flow models. Master's thesis, Microanalysis of Heterogeneous Radiation in Particulate Matter as an Aid to Nuclear Source Identification.

Boston University Bachelor of Science degree in General Engineering with an American Chemical Society accredited concentration in Chemistry

Recent publications

Absorbed Dose Rates and Biological Consequences of Discrete Alpha-Emitting Particles Embedded in Tissue, M. Kaltofen, P. Plato, accepted May 10, 2024, J. Applied Rad. & Isotopes

Radioactive Microparticles Related to the Woolsey Fire in Simi Valley, CA, M. Kaltofen, A. Gundersen, M. Gundersen, accepted Sept. 27, 2021, J. Environmental Radioactivity

Radioactive Isotopes Measured at Olympic and Paralympic Venues in Fukushima Prefecture and Tokyo, Japan, M. Kaltofen, A. Gundersen, M. Gundersen, accepted Sept. 23, 2020, J. Env. Eng. Science

Letter concerning: *Clewell (2019) incorporation of in vitro metabolism data and physiologically based pharmacokinetic modeling in a risk assessment for chloroprene*, Marco Kaltofen, Keeve E. Nachman & Dale Hattis (2020), Inhalation Toxicology, DOI: 10.1080/08958378.2020.1806960

Forensic microanalysis of Manhattan Project legacy radioactive wastes in St. Louis, MO, accepted Feb. 5, 2018, J. Applied Radiation and Isotopes

Microanalysis of Particle-Based Uranium, Thorium, and Plutonium in Nuclear Workers' House Dusts, accepted May 2, 2018, J. Env. Eng. Sci.

Radioactively hot Dust Particles in Japan, (J. Sci. Total Env. 607-608C (2017) pp. 1065-1072)

Tracking legacy radionuclides in St. Louis, Missouri, via unsupported 210Pb, J. Env. Rad., 153, 2016, 104-111

Assessing human exposure to contaminants in house dust, PhD dissertation, March 12, 2015, WPI Tracking radioactive dust in northern Japan, WPI, March 2012

Tracking radiological plumes from the Fukushima Daiichi accident Presentation at 139th annual meeting of the APHA, Washington, DC

Persistence of DWH n-alkanes and PAHs, Bay Jimmy marshes, Barataria Bay, LA: Year 1, USF Conference presentation, October 2011

Microanalysis of Workplace Dusts from the Mixed Waste Tank Farm of the Hanford Nuclear Reservation, J. Env. Eng. Sci., February 2010.

Recent lectures

Massachusetts Inst. of Technology, List Visual Arts Center, *Art and Data in Science Communication*
Dartmouth College, Thayer School of Engineering, *Transport of radiation from Fukushima Daiichi*
DESCON 7, Belgrade, Serbia, 2022, *Nongovernmental radiation surveillance tools*
Tufts School of Medicine, *Oil & dispersants from the Gulf oil spill*
Tufts School of Medicine, *Radiation exposure to the people of northern Japan*
University of Washington, *Radiation transport by hot particles*
Worcester Polytechnic Institute, *Fingerprinting of crude oil in the Gulf of Mexico oil spill*
Loyola University, *Dispersants and their effects on PAH concentrations in seawater*
Chelyabinsk School of Law, Chelyabinsk Oblast, Russia, *International trade in radioactive wastes*

Professional Achievements (selected)

Recent grants
Reference Girl Project – A universal radiation dosimetry model independent of age and biological sex
Study of radionuclides of power plant origin, Plymouth, MA, with T.H. Chan Sch. of Public Health
Health physics advisor to the Tribal Council of The Havasupai Tribe of the Grand Canyon at Supai, AZ
Art and Science collaboration with Harvard GSD Design Curator, Andy Warhol Visual Arts Foundation
John D. & Catherine T. MacArthur Foundation for field work in Hanford, WA, and Belgrade, Serbia
Hiroshima Peace Memorial Foundation – Fukushima field studies grant

<u>Science Communications (selected)</u>

Court-Qualified as an expert witness in State and Federal courts in the fields of Chemistry and Civil Engineering, as well as in >50 science-related civil depositions

Extensive communications experience with cites from Good Morning America, the Today Show, NBC Nightly News, CNN, AP, C Span, TBS, NPR, U S News & World Report, & >3000 media citations

Presenter to US Senate Energy Com. & members on Radiation Victims Compensation Act of 2024

Co-Chair, US Army Soldier Systems Biological and Chemical Command Superfund Restoration Advisory Board. Extensive communication with public, regulatory, state and federal public health authorities and military agencies, including the DOD and DOE

Performed site investigations of a Refinery/Chloralkali complex in the vicinity of Volgograd, Russia, with follow up presentations at US and UK foreign services events

<u>Radiological investigations (selected)</u>

Harvard University T.H. Chan School of Public Health, Environmental Chemistry Laboratory, Plymouth Pilgrim Nuclear Power Station environmental analysis study design

Japan 2020 Olympic Sites - field sampling and analysis of radio-cesium in soils, 2018; research team leader at WPI Nuclear Science and Engineering Program

Study design for radiologic and mixed waste contaminants along the Techya River downstream of the Mayak Chemical Nuclear facility in the Ural Mountains in Russian Central Asia

Particulate sampling and analysis of uranium, plutonium, americium, and gaseous iodine-containing environmental materials, Richland, WA and the Yakama Indian Nation

Analysis of cesium 137 in components from the Chernobyl Unit 4 reactor, Ukraine.
Presented radiological monitoring and testing seminar at St. Petersburg, Russia conference on nuclear policies and technologies.

Performed an onsite review of radiological monitoring and laboratory procedures for the regional and municipal environmental authorities in Chelyabinsk and Chelyabinsk Oblast, Russia.

Determined total alpha and beta emitters in river sediments from Nanda Devi Glacier near Lata, India, related to naturally occurring uranium and plutonium 238 and 239 contamination.

Determination of uranium isotopes in aircraft engines exposed to particulate matter from use in Iraq and Afghanistan

Completed study designs, field sampling, and onsite monitoring for an offsite radiologic contaminant migration study at Los Alamos National Laboratory in Los Alamos, New Mexico

Chemical & petroleum investigations (selected)

BP / Transocean spill responder - Mississippi Canyon 252 Deepwater Horizon oil spill, Engineer responsible for sampling, testing and inspection of crude oil contamination in the Gulf of Mexico

Lead Field Engineer responsible for sampling and inspection of Murphy Oil Co. spill-related damage in St. Bernard Parish, LA following Hurricane Katrina

Review and validation of site data including field verification related to environmental quality analyses at Love Canal, Niagara Falls, NY

Sampling and analysis of particulate matter, dusts, and fire/railcar debris related to a train derailment and fire near Cleveland, Ohio

Review and inspection of a former New Jersey iron mine on Ramapo Tribe of Indians land now used for automobile paint waste disposal

Performed post-Hurricane Katrina field examination of petroleum spills in Mobile Bay, Mobile, Alabama and Pascagoula, Mississippi

Designed sampling protocol and carried out all analyses for closure of a scientific base in Antarctica, including characterization of petroleum and Jet A1 releases

Performed an onsite review of Soviet Environmental Ministry and Ministry of Chemical Industry environmental monitoring procedures and laboratories analyses for steel production and natural gas processing in Volgograd, USSR.

Designed sampling protocols and performed analyses of air, water, and sediment samples from the Kingdom of Kuwait

Reviewed field laboratory designs and field procedures for NGO laboratory testing facilities based in Amsterdam (The Netherlands) and in Russia

Designed and carried out a complete sampling and laboratory analysis protocol for a seventy-site study of wastewater effluent characteristics in Mexican automobile and electronic component plants

Sampled and analyzed chlorinated pesticide residues in residential soils in Matamoros, Mexico

Data review and method validation for nerve agents and blister agents (including Sarin and Mustard- HD). Review of US Army procedures for GC-MS, GC-FPD used at the Umatilla Chemical Depot

Instrumentation experience

- Registered drone operator for geolocated airborne radiation sensing
- Gas chromatography with electron capture & mass spectral detection - GC/MS/ECD
- Direct injection mass spectroscopy - MS
- Gas chromatography with flame ionization detection - GC/FID
- Atomic Absorption with flame and graphite furnace excitation - AAS and GFAAS
- Inductively coupled plasma emission spectroscopy - ICP
- Field gamma spectrometry by cadmium/telluride detection
- Gamma spectrometry by sodium/iodide and liquid nitrogen cooled GeLI detection
- Infrared spectroscopy - IR
- Direct current plasma emission spectroscopy - DCPES
- Scanning electron microscopy / Energy-dispersive X-ray spectroscopy - SEM/EDX
- Mercury cold vapor atomic absorption spectroscopy - CVAAS
- Air contaminant monitoring for radionuclides, particulates, VOCs, formaldehyde, CO
- Alpha/beta counting using Ludlum 3030 instruments
- SEM/EDS operations for forensic nuclear examinations and nonproliferation compliance

Awards and acknowledgements

Massachusetts Registered Professional Civil Engineer
Graduate certificate in Nuclear Science and Engineering
Boston University College of Engineering Distinguished Alumni Award for Community Service
Boston University School of Public Health Superfund Basic Research Program
Science for the Benefit of Environmental Health Award
Member American Society of Civil Engineers, Boston Society of Civil Engineers Section/ASCE, Committee on National Accreditation of Environmental Laboratories, American Chemical Society - National and Northeastern section

Professional service

Reviewer, John D. & Catherine T. MacArthur Foundation, $100 Million&change grant program
U. S. Army Restoration Advisory Board Chairman, (28 years), Soldier Systems Center
Deepwater Horizon Oil Spill Principal Investigator Conference, NSTC JSOST, 2010
Toxics Action Center, Boston, Massachusetts - Board member, lecturer
Nat. Academies of Sciences, Engineering, and Medicine - Nuclear waste treatment advisory board contributor
US National Park Service - volunteer historic interpreter
Hanford Challenge - Board member
Provides pro bono radiological tech support for nonprofit education and community service organizations
US Army Science, Math and Technology Student Competitions, Judge
Voting member of the USEPA Committee on National Accreditation of Environmental Laboratories