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Engineering & Scientific Consulting

Renan Valenca, Ph.D., P.E.

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Professional Profile

Dr. Renan Valenca has consulting experience in chemical and environmental engineering. He is a licensed civil engineer and has focused his expertise on engineering investigations of water resources (stormwater, surface water, and groundwater) and water treatment systems.

Dr. Valenca's experience includes environmental forensics and contaminant fate and transport in natural and engineered systems, including within the vadose and saturated zones, for constituents such as per- and polyfluoroalkyl substances (PFAS), chlorinated solvents (specifically PCE and TCE), pathogens, nutrients, and metals. Dr. Valenca has advised industrial clients, property owners, and government institutions regarding vapor intrusion of volatile chemicals, environmental compliance and due diligence, and optimization of water treatment systems. He uses his expertise to reconstruct environmental chemical releases and evaluate the contributions of potentially responsible parties.

Throughout his doctoral studies, Dr. Valenca developed climate-resilient stormwater treatment systems using sustainable soil amendments (e.g., biochar, iron filings, compost, fly ash) through a combination of laboratory and in-situ experiments. He optimized these stormwater systems to enhance the degradation of specific contaminants based on local climate conditions. In addition, Dr. Valenca is a registered Chemical Engineer in Brazil, where he worked in the ceramic industry developing waste management and reutilization programs and supporting the QA/QC process of ceramic tile production.

Academic Credentials & Professional Honors

Ph.D., Civil Engineering, University of California, Los Angeles (UCLA), 2022

M.S., Civil Engineering, University of California, Los Angeles (UCLA), 2018

B.Sc., Chemical Engineering, Universidade Federal de Alfenas, Brazil, 2016

B.Sc., Science and Technology, Universidade Federal de Alfenas, Brazil, 2014

Fellowships and Scholarships:</strong

National Science Foundation Research Traineeship – Food, Energy and Water Systems, 2020-2021

University of California Los Angeles Dissertation Year Fellowship, 2020-2021

Los Angeles Urban Center Fellowship, 2020-2021

Martin Rubin Scholarship – High Achieving Civil and Environmental Engineering Graduate Student, 2020

Licenses and Certifications

Professional Engineer, Texas, #155127

Prior Experience

Senior Researcher & Laboratory Manager, UCLA Subsurface Engineering & Analysis Laboratory, 2017–2022

Teaching Assistant, University of California Los Angeles, 2018–2022

Chemical Engineering Intern, Porto Ferreira Ceramic Industry, 2015

Research and Development Laboratory Analyst Intern, Porto Ferreira Ceramic Industry, 2012

Professional Affiliations

American Society of Civil Engineers (ASCE)

American Chemical Society (ACS)

American Water Works Association (AWWA)

Latin America Network for Soil and Water Management (NICOLE)

Languages

Italian

Portuguese

Spanish

Publications

Raoelison, O. D., Valenca, R., Lee, A., Karim, S., Webster, J. P., Poulin, B. A., & Mohanty, S. K. Wildfire impacts on surface water quality parameters: Cause of data variability and reporting needs. Environmental Pollution 2023. 317, 120713.

Valenca R, Garcia L, Espinosa C, Flor D, Mohanty SK. Can water composition and weather factors predict fecal indicator bacteria removal in retention ponds in variable weather conditions? Science of The Total Environment 2022. 156410.

Valenca R, Borthakur A, Le H, Mohanty SK. Biochar role in improving pathogens removal capacity of stormwater biofilters. Advances in Chemical Pollution, Environmental Management and Protection 2021. Vol. 7, pp. 175-201.

Ghavanloughajar M, Borthakur A, Valenca R, McAdam M, Khor CM, Dittrich TM, Stenstrom MK, Mohanty SK. Iron amendments minimize the first-flush release of pathogens from stormwater biofilters. Environmental Pollution 2021. 281:116989.

Valenca R, Le H, Zu Y, Dittrich TM, Tsang DC, Datta R, Sarkar D, Mohanty SK. Nitrate removal

uncertainty in stormwater control measures: Is the design or climate a culprit? Water Research 2021. 190:116781.

Valenca R, Borthakur A, Zu Y, Matthiesen EA, Stenstrom MK, Mohanty SK. Biochar selection for Escherichia coli removal in stormwater biofilters. Journal of Environmental Engineering 2021. 147(2):06020005.

Tirpak RA, Afrooz AN, Winston RJ, Valenca R, Schiff K, Mohanty SK. Conventional and amended bioretention soil media for targeted pollutant treatment: A critical review to guide the state of the practice. Water Research 2021. 189:116648.

Le H, Valenca R, Ravi S, Stenstrom MK, Mohanty SK. Size-dependent biochar breaking under compaction: implications on clogging and pathogen removal in biofilters. Environmental Pollution 2020. 266:115195.

Baalousha M, Wang J, Nabi MM, Loosli F, Valenca R, Mohanty SK, Afrooz N, Cantando E, Aich N. Stormwater green infrastructures retain high concentrations of TiO2 engineered (nano)-particles. Journal of hazardous materials 2020. 392:122335.

Valenca R, Ramnath K, Dittrich TM, Taylor RE, Mohanty SK. Microbial quality of surface water and subsurface soil after wildfire. Water Research 2020. 175:115672.

Ghavanloughajar M, Valenca R, Le H, Rahman M, Borthakur A, Ravi S, Stenstrom MK, Mohanty SK. Compaction conditions affect the capacity of biochar-amended sand filters to treat road runoff. Science of the Total Environment 2020. 735:139180.

Berger AW, Valenca R, Miao Y, Ravi S, Mahendra S, Mohanty SK. Biochar increases nitrate removal capacity of woodchip biofilters during high-intensity rainfall. Water Research 2019. 165:115008.

Valença RL, Ferraço F. Reutilization of the Solid Waste Materials Produced by a Ceramic Tiles Industry as a Raw Material for the Production of New Ceramic Tiles. In Materials Science Forum 2018. Vol. 912, pp. 180-184.

Presentations

Valenca, R. and Mohanty, S.K. The relative importance of climate and design on nitrate removal in stormwater control measures. American Chemical Society Spring 2021 National Meeting. San Diego, CA, USA. March 20-24, 2021.

Valenca, R. and Mohanty, S.K. Turning the Nation's road infrastructure into a network of stormwater treatment systems. Council for Watershed Health (CWH) Rain or Shine: Soaking Up Success Symposium, Los Angeles, CA, USA. October 15, 2020.

Valenca, R. and Mohanty, S.K. Designing resilient stormwater treatment systems to mitigate climate change impact. ASCE International Conference on Sustainable Infrastructure. Los Angeles, CA, USA. November 7-9, 2019.

Valenca, R. and Mohanty, S.K. Microbial risk from wildfire residues. 258th American Chemical Society National Meeting, San Diego, CA, USA. August 25-29, 2019.

Valenca, R., Kalra, S., Lothe, A., Mahendra, S., and Mohanty, S.K. Fungi-augmented biofilters for the removal of energetic compounds from stormwater runoff and groundwater. 256th American Chemical Society National Meeting, Boston, MA, USA. August 19-23, 2018.

Valenca, R. L., Ferraco, F. Reutilization of the Solid Waste Materials Produced by a Ceramic Tiles Industry as a Raw Material for the Production of New Ceramic Tiles. 60th Brazilian Congress on Ceramics, Águas de Lindoia, SP, Brazil. May 15-18, 2016.

Project Experience

Per- and poly-fluorinated alkyl substances (PFAS)

- Advised clients on historical environmental compliance related to PFAS and regulatory changes applicable to manufacturing activities in the states of Ohio and North Carolina. Managed the development of a roadmap of industrial and governmental actions and provided technical analyses to support expert witness opinions.
- Identified multiple potential industrial and commercial sources of PFAS to analyze PFAS source contributions across multiple municipalities in Vermont and New Jersey. Investigated and constructed a supply-chain roadmap of multiple commercial and/or industrial activities that may use PFAS. Linked the supply-chain results to wastewater discharges to explain the local fate and transport of PFAS using hydrology and vadose zone concepts.
- Investigated the historical use of aqueous film-forming foam (AFFF) products in firefighting activities in multiple municipalities in South Dakota and New Jersey. Identified various AFFF chemical structures and studied the local hydrology to understand the potential source(s) of PFAS contamination in municipal drinking water wells.
- Assisted a California airport responding to an investigative order related to historical use of AFFF. Evaluated site data, potential impacts to off-site residents, and effectiveness of drinking water treatment technologies.

Chlorinated solvents

- Reconstructed more than 40 years of industrial occupancy of two adjacent properties to investigate potentially responsible parties that may have contributed to a chlorinated solvent groundwater plume in Los Angeles County. Analyzed the historical industrial activities of each industry and location by reviewing historical permits, notices of violation, waste disposal records, and other documents to determine the likelihood of chemical usage by the industry. Assisted in developing an expert report to summarize the findings of the investigation.
- Supported the development of multiple expert witness reports regarding contamination of soil and groundwater with trichloroethene (TCE) in an environmental dispute involving over $1B in estimated liabilities from a former lead-smelter in Los Angeles, CA.
- Investigated historical data using environmental forensics techniques to determine whether tetrachloroethene (PCE) from dry cleaning activities were related to on-site practices and assess potential sewer line contributions in Santa Clara, CA. Performed point-source contamination analysis to support expert opinions regarding the source of PCE contamination in groundwater and soil vapor. Estimated the impact of remediation delays on the size of the PCE groundwater plume. Evaluated the cost of remedial measures including horizontal and vertical soil vapor extraction in commercial and residential properties. Assisted the client with settlement mediation.
- Analyzed alleged historical (> 40 years) releases of PCE from dry cleaning activities and investigated the likelihood of sewer pipe failures contributing to soil and groundwater contamination in Modesto, CA. Compiled historical sewer maintenance records and led the analysis of sewer cleaning and maintenance frequencies. Supported expert witness preparation for depositions and trial.
- Managed the review of historical documents to assess groundwater contaminated with PCE allegedly from a dry cleaner in Sonora, CA. Analyzed and compiled historical data describing PCE concentrations in groundwater near the property and investigated other nearby dry cleaners as potential contributors. Advised the client about on-going and future remedial activities to mitigate human health risk attributed to indoor air inhalation of PCE.
- Led the development of a database for environmental data related to historical TCE contamination of soil and groundwater from a confidential party in Los Angeles, CA. Analyzed

and estimated the historical quantity of TCE present in soil pore water and evaluated the changing state of the groundwater contamination plume.

- Optimized a database to estimate human health exposure risk to underlying groundwater contamination containing TCE originating from a manufacturing facility in Goshen, IN. Calculated cancer risks and hazard quotient for residents of all ages (from in-utero to elderly) based on indoor air TCE concentration, exposure time, frequency and duration. Supported the development of expert opinions to understand and disentangle the connection between disease and inhalation of TCE in indoor air.
- Assisted a large-scale metal plating facility located in Los Angeles, CA to investigate environmental contamination of soil and groundwater with chlorinated solvents and hexavalent chromium and understand on-site remedial action needs. Analyzed the impact of off-site contaminant sources to on-site areas based on local groundwater gradient and direction. Assessed the potential impacts of on-site historical manufacturing operations on observed soil and groundwater levels.

Environmental compliance

- Assisted on an international arbitration matter involving environmental due diligence related to the purchase of oilfield assets in Peru. Investigated and processed thousands of documents related to historical environmental reports (in Portuguese, Spanish, and English) along with environmental data to support expert opinions.
- Led technical analyses of Brazilian Environmental Laws that regulate mining activities and requirements related to the disposal of mining tailings in reservoirs in the state of Minas Gerais, Brazil. Assisted the Client in evaluating environmental regulations applicable to tailings dams prior to 2015 by reviewing historical documents related to operating licenses, environmental impact studies, mining operations manuals, environmental control plans, and environmental monitoring plans.

Water, wastewater, and stormwater treatment systems

- Managed the development of an expert report related to the performance of a fine-bubble aeration system used to treat wastewater in California. Analyzed historical system operations, standard and re-configured engineering designs, and regulatory compliance. Assisted with depositions of opposing experts.
- Investigated the failure of an aeration system in a wastewater treatment plant in Mississippi. Performed oxygen transfer analysis of current and previous aeration systems to evaluate system performance. Evaluated the operations and maintenance of the WWTP and NPDES permit compliance. Prepared technical analyses for an expert report to summarize the findings of the investigation.
- Evaluated the impact of heavy rainfall events on building damage in a large semi-conductor manufacturing site in Texas. Modeled the flow path of roof runoff using historical precipitation data and historical construction drawings. Assisted with the development of a report that depicted the reasons behind the building's water-related damage.
- Evaluated design concepts for a manure treatment system for a dairy farm by assessing multiple treatment technologies – from conventional to advanced technologies that involved carbon credits – that could treat the same volume of wastewater manure in a smaller operational area. Contacted multiple companies to understand their technologies, gathered cost estimates, and advised the client regarding which technology best suited their practices and goals.
- Assessed the capacity of different biochar materials to remove pathogens from stormwater and provided guidance to stormwater managers for selecting biochar materials from suppliers. Performed laboratory studies with model biofilters to assess the removal of Escherichia coli and built statistical models to link short-term and long-term bacterial removal capacities of biochar with its commonly reported properties (surface area, carbon content, ash content, and volatile organic carbon content).

- Advised stormwater engineers on testing procedures to evaluate soil amendments to optimize the removal of nutrients, pathogens, and heavy metals from stormwater in bioretention systems that would be widely implemented in a major West Coast city. Assisted with influent water characterization, data processing, and experiment QA/QC.

Water contamination risk

- Managed the investigation of groundwater contaminated with perchlorate from historical industrial activities in Los Angeles, CA, and evaluated the potential impact to local drinking water wells. Calculated and analyzed the transport of water through vadose zone under varying recharging conditions to assess contaminant travel time to a deep (>300 ft) groundwater aquifer. Calculated horizontal groundwater velocity using Darcy's Law and estimated perchlorate travel time using seepage velocity techniques.
- Evaluated the potential risks related to pathogens in spa mud therapy material and the ingestion of locally-sourced mineral water. Developed reports, provided technical support for marketing strategies, and advised on the use of local mineral water for drinking and irrigation purposes.

Industrial waste management

- Researched natural and engineered remediation strategies to manage phosphate-contaminated industrial wastewater prior to disposal. Evaluated the removal performance of biofilters for phosphate-contaminated water in the laboratory and cleanup strategy options including floating wetlands, submerged adsorbing material bags, and filtration-based systems.
- Developed a waste management program to reutilize ceramic tile waste materials as raw materials. Analyzed the performance of the new ceramic tile recipe and quantified the cost reduction of the new waste management program.

Peer Reviews

Water Research

Science of the Total Environment

Blue Green Systems

Environmental Research