

Sean L. Culkin, P.G., C.H.G.

Consultant



Education and Credentials

M.S., Geosciences, Pennsylvania State University, University Park, Pennsylvania, 2007

B.A., Earth and Planetary Sciences, Johns Hopkins University, Baltimore, Maryland, 2005

Professional Geologist: California (License No. 8845)

Certified Hydrogeologist: California (License No. 990)

Continuing Education and Training

Hazardous Waste Operations and Emergency Response 40-Hour Certification (2007; refreshers 2008 through 2017)

First Aid and CPR Certified (2008)

QSP/QSD Training (2011)

Professional Affiliations

Groundwater Resources Association of California

National Ground Water Association

Professional Profile

Mr. Sean Culkin is a consulting professional with more than 10 years of experience serving a diverse range of clients. He is a California registered professional geologist and certified hydrogeologist who leverages his skills in analytical and quantitative hydrogeology to support a wide range of projects for private and public sector clients. His experience includes site characterization, water resources management, project management, conceptual site model development, soil and groundwater remediation, remedy optimization, and regulatory compliance. He has developed a solid track record of successful project execution and has provided technical guidance and oversight for numerous projects throughout the United States. Mr. Culkin has extensive experience with industry-standard groundwater modeling software applications, and has used site-specific numerical and analytical groundwater models to support both remediation system design and evaluation, geotechnical operations, and basin-wide resource management planning for groundwater and surface water supplies.

Relevant Experience

Remediation

Remediation of Current and Former Military Facilities, California and Nevada—Developed work at a portfolio of military facilities through longstanding partnership with 8(a) contractor and U.S. Army Corps of Engineers. Work included construction of a calibrated flow and transport model in a regional coastal aquifer system. Used calibrated models as the basis for a groundwater model optimization effort to maximize the effectiveness of the extraction/injection well network for active remediation of chlorinated solvents. These efforts successfully informed efficient installation and operation of capture wells concurrent with a treatment system redesign. Used flow models to perform ongoing capture zone analysis to assess ongoing successful treatment system performance, as well as fate and transport models to demonstrate long-term migration of contaminants.

Former Wood Treating Facilities, Various Locations, United States—Lead hydrogeologist for characterization and remediation of former wood treating sites in a variety of geologic settings, including riparian, coastal, and shallow karst environments. Developed site



characterization work plans for feasibility studies and data gaps analysis. Prepared technical documentation on the fate and transport of dense nonaqueous-phase liquid and remediation feasibility. Developed site-specific groundwater models to assess fate and transport of PAHs and support remedy alternative design. Provide strategic and technical support of existing consultant teaming partners.

RCRA Corrective Action, Brunswick, Georgia—Used density-dependent groundwater flow and transport modeling to assist project team’s reinterpretation of the conceptual site model for offsite migration of VOCs for a revised corrective action approach. Updated previous consultant’s model to more accurately simulate coastal aquifer dynamics. Used particle tracking and 1-dimensional transport and attenuation models to support offsite plume characterization.

Hydrogeologic Assessment at a PFAS Site, Confidential Location—Supported hydrogeologic assessment of a site impacted by per- and polyfluoroalkyl substances (PFAS). Performed aquifer test analysis, groundwater model updates, and containment system optimization.

Perchlorate Groundwater Remediation Project, San Francisco Bay Area, California—Provided technical oversight for the assessment and remediation of a sedimentary basin contaminated with perchlorate resulting in impacts to private and municipal water users. Characterized basin hydrostratigraphy and contributed to conceptual model development via sonic core logging, aquifer pumping and injection tests, monitoring of a basin-wide transducer network, pneumatic slug testing, and lateral/vertical plume delineation from a network of nested monitoring wells and domestic pumping wells. Characterized basin groundwater flow, as well as groundwater–surface water interactions, via chemical and isotope analysis. Developed the conceptual design and performance estimates for an innovative remediation well network via analytical solutions, flow and transport modeling, and model optimization techniques. Efforts significantly reduced client implementation costs. Led the team that designed and implemented an efficient groundwater monitoring network to meet stringent regulatory requirements. Developed a regional groundwater flow model to support of treatment system design and remedial optimization. Performed statistical analysis for evaluating an approved natural attenuation remedy for a portion of the basin. These efforts contributed to substantial reduction of monitoring time and expenditure by the client and successful remediation of private water supply wells.

Groundwater Remediation Operations, Superfund Site, San Fernando Valley, California—Contributed to ongoing updates to the basin conceptual site model via well log analysis/correlation and evaluation of depositional histories. Acted as team leader for extensive hydrogeological field investigation, including aquifer testing, slug testing, and down-hole electromagnetic flow logging. These analyses, along with review of available well logs, contributed to a successful update of the conceptual site model and remedial strategy. Delineated contaminant distribution of chlorinated solvents, metals, and 1,4-dioxane through geostatistical interpolation that filled significant data gaps and improved understanding of plume delineation.

Soil and Groundwater Remediation of a Former Chemical Production and Storage Facility, San Francisco Bay Area, California—Led groundwater monitoring program on dynamic, multi-



consultant site with ongoing *in situ* remediation of chlorinated solvents. Responsible for RCRA regulatory compliance and was lead author on report deliverables. Oversaw aquifer testing and characterization, including short-term pumping tests and slug tests. These tests provided relatively low-cost, efficient characterization of aquifer properties of contaminated areas with minimal waste generation that contributed to *in situ* remediation design.

Characterization and Groundwater Remediation of a Former Chemical Production Facility, Los Angeles, California—Led the monitoring/reporting program for remediation of a chlorinated solvent site and directed subcontractors. Used geospatial analysis to implement sampling frequency reduction for the monitoring well network and reduce costs. Characterized local hydrostratigraphy via well logs and an in-well transducer network. Assessed injection well operations for the West Coast Basin Barrier Project to address concerns about potential interaction with contaminants in coastal aquifers.

Characterization and Groundwater Remediation of a Former Manufacturing Facility, Los Angeles, California—Employed analytical element modeling to assist groundwater remediation system design. These models provided an efficient platform for design of injection/extraction well configuration and operations. Acted as groundwater monitoring and reporting program leader and directed the industrial client's offsite data management contractors, which resulted in substantial cost savings for routine analysis and reporting.

Agricultural Well Investigation, Northern California—Performed ambient and dynamic down-hole flow logging at wells on an organic farm that had been impacted with chlorinated solvents. Calculated groundwater and contaminant mass flux through screen intervals for other flow pathways. Characterized well construction and hydrostratigraphy through a video log of open rock boreholes. Oversaw pump reinstallation and well maintenance. The resulting analysis provided the basis for successful ongoing well operations to maintain groundwater availability from the wells.

Remediation of a Brownfield Site, San Francisco Bay Area, California—Characterized site geology, hydrogeology, and extent of solvent and metals contamination via direct-push sampling and logging. Oversaw an *in situ* bioremediation pilot study for enhanced reductive dechlorination that led to successful full-scale injection operations and eventual site closure and redevelopment.

Water Resources Management

Water Resources Management, Olympic Valley, California—Acted as project manager and lead groundwater modeler to support the public utility client and associated private property developers, including developments undergoing environmental impact studies. Acted as a technical resource for the client at public-facing meetings. Performed groundwater model calibration and utilized the updated model for long-term planning operations for client. Successfully developed criteria for estimating long-term maximum groundwater supply within the valley that refined and improved on previous investigations. Provided review and evaluation of local hydrogeology to assist developers with property dewatering and construction operations.



Groundwater Resources Management, Santa Cruz County, California—Provided project and task management for a group of public clients utilizing a shared groundwater resource within Santa Cruz County. Coordinated with environmental impact report team of consultants and agencies for planned supplemental water supply projects within the basin. Authored documents pursuant to the California Sustainable Groundwater Management Act that resulted in acceptance of basin boundary modifications by the California Department of Water Resources, and promoted sustainable groundwater management through basin consolidation. Led construction of groundwater–surface water models in conjunction with the U.S. Geological Survey and made presentations to the basin Technical Advisory Committee. This model will provide a robust platform to test a number of groundwater management alternative strategies within the basin. Developed and ran site-specific flow and transport models to evaluate impact of seawater intrusion, resulting in updated management objectives for the basin that improved on previous methods.

Simulation of Groundwater Flow, Hawaii—Used groundwater models to simulate groundwater flow and seawater intrusion dynamics in a coastal volcanic aquifer. These models were used to assess the ecological risk of heated wastewater discharged to offshore through the aquifer. This work was performed in support of discharge permitting for a proposed bioenergy facility.

Water Budget Study, City of Oakland, California—Developed an analytical tool to estimate average water demand for public properties based on landscaping type and evapotranspiration data. Estimated values were generally corroborated by water use data from the city. Results were used to inform future water use strategies.

Litigation and Expert Services

Groundwater Modeling Related to Residential Development, San Francisco, California—Lead expert hydrogeologist on a team of geotechnical and structural engineers supporting litigation related to a high-profile residential development in San Francisco. Constructed site-specific groundwater models for analysis of local hydrogeology and construction dewatering. Gave formal presentations of technical findings to the mediation group. Quickly developed a detailed conceptual site model of the downtown San Francisco groundwater basin. Worked with geotechnical engineer partners to develop a 3-dimensional time history of subsurface material property changes in the vicinity of the building. These efforts contributed to a favorable settlement for the property developer.

Superfund Site, Portland, Oregon—Produced expert report for litigation surrounding a specific parcel of a large industrial Superfund site. Worked with counsel to refine and redevelop a complex fate and transport conceptual site model of interconnected surface water and groundwater pathways at this multiparty site. Case ongoing.

PFAS Litigation Support, Various Locations, Nationwide—Provided technical analysis of PFAS fate and transport in the vicinity of various industrial facilities. Reviewed hydrologic data and developed analytical models to calculate riverine contaminant flux time histories.



Natural Resources Damages (NRD) Case, Washington—Supported expert report production for the groundwater portion of an NRD case. Reviewed plaintiff documents and provided critique of technical approach and damages claims. Analyzed local and regional hydrogeology and assessed the viability of managed aquifer recharge. Performed sustainable yield calculations to refine damages estimate. Case ongoing.

Construction Dewatering Effects on Groundwater Flow, Seattle, Washington—Analyzed the impact of numerous construction dewatering projects on groundwater flow and contaminant transport in the vicinity of an urban redevelopment project. Performed groundwater drawdown and capture analysis. The revised hydrogeologic conceptual model supported expert testimony on site contamination transport history.

Groundwater Investigation, Santa Cruz County, California—Led groundwater pumping well, stream/aquifer interaction, and sampling investigations in response to state inquiries in Santa Cruz County, resulting in successful resolution with the state for the agricultural landowner.

Geotechnical

Construction Dewatering Projects, Los Angeles Basin, California—Oversaw all phases of planning, scoping, permitting (including NPDES), performance, and data collection associated with aquifer characterization to aid in dewatering design and subsurface construction plans. Analyzed pumping and slug test data to evaluate projected inflow during construction dewatering. Results of the investigations led to substantial improvements over the dewatering contractor recommendations and averted large future costs and engineering difficulties for the clients. Utilized analytical element and traditional numerical flow models to evaluate the effects of dewatering systems on the local hydrogeology. Used models to perform forensic analysis to improve the clients' understanding of unsuccessful dewatering designs.

Transit and Utility Alignment Projects, Los Angeles Basin, California—Provided technical support for aquifer tests associated with dewatering activities for subsurface transit alignments. These projects included the Westside Subway Extension, as well as water pipeline alignments.

Publications

Culkin, S. 2013. Use of genetic algorithm optimization for operational management of extraction wells within a mature groundwater plume, Monterey Bay, California. *MODFLOW and More 2013*.

Chamberlain, W.C., S. Culkin, and X. Xu. 2012. Hydrogeologic characterization in the development of underground structures—Los Angeles Basin, California. *Environmental and Engineering Geoscience* 18(3):295–308.

Culkin, S. 2008. Implications of rate-limited mass transfer for aquifer storage and recovery efficiency. *Ground Water* 46(4):591–601.



Presentations/Posters

Culkin, S. 2019. Evaluation saltwater–freshwater dynamics in coastal aquifer conceptual site model development and groundwater management. Platform presentation at AEHS 29th Annual International Conference on Soil, Water, Energy, and Air, San Diego, CA. March 18–21.

Culkin, S. 2017. Using cross-sectional models to develop proxy measurable thresholds for seawater intrusion. SGMA Conference, Tools for Developing a GSP, Groundwater Resources Association of California, Modesto, CA.

Culkin, S. 2016. Using cross-sectional models to develop measurable objectives for saltwater intrusion. 2016 Annual Meeting Program, Modeling Extremes: Drought to Flood and In-Betweens, California Water and Environmental Modeling Forum, Folsom, CA.

Culkin, S. 2013. Hydrogeological characterization in the development of underground structures—Los Angeles Basin, California. 2013 Annual Meeting Program with Abstracts, Association of Environmental & Engineering Geologists, Seattle, WA.

Culkin, S. 2007. Understanding aquifer storage and recovery efficiency in a clastic-limestone aquifer, Charleston, South Carolina. Geological Society of America Abstracts with Programs, Vol. 39. No. 1.

Culkin, S., and A.M. Franzese. 2004. Distinguishing between provenance changes and sorting effects on the Rb-Sr systematics in glacial and Holocene South Atlantic sediments. AGU Fall Meeting Abstracts.

