

Peter Quinlan has over 30 years' experience as a professional hydrogeologist. He worked in groundwater exploration and water resources evaluation for Tetra Tech International and the government of Oman before returning to the United States and working for first Hargis + Associates and then Dudek. Mr. Quinlan's current professional responsibilities include design and supervision of groundwater contamination investigations at hazardous waste sites. Areas of specialization include planning and supervision of field operations for groundwater and soils contamination investigations, groundwater modeling, water resource studies, cost allocation among multiple potentially responsible parties (PRPs) at Superfund sites, and environmental assessments.

EDUCATION

University of Arizona, Tucson
MS Hydrology, 1982

CERTIFICATIONS

Registered Geologist
AZ No. 26772(exp. 3/31/2017)

PROJECT EXPERIENCE

Litigation Support

- Expert Witness in *OCWD v Sabic* litigation among OCWD and 30 parties over groundwater contamination in the South Basin of the Orange County Groundwater Basin.
- Provided fate and transport modeling of vadose zone and groundwater to support AC Products in litigation over contamination in the North Basin of the Orange County Groundwater Basin in *OCWD v Northrup*.
- Evaluated potential hydraulic connection between surface water in the San Diego River and groundwater in the San Diego Formation for the Sweetwater Authority in its defense of the assertion by the City of San Diego of its Pueblo Rights to groundwater in the San Diego Formation. Also evaluated in potential for seawater intrusion to result from the expansion of well fields in the San Diego Formation.
- Designated Expert for Pyro Spectaculars in Rialto perchlorate plume litigation.
- Expert witness in mediation settling litigation between insurance carrier and Department of Defense over liability for remediation costs due to perchlorate contamination at the Bermite site in Saugus, California.
- Expert witness in litigation over liability for PCE release from a dry cleaning facility in San Jose, California.
- Expert witness in insurance litigation at a PRP site in the Baldwin Park Operable Unit of the San Gabriel Valley Superfund sites.
- Expert witness in insurance litigation concerning perchloroethylene (PCE) contamination at five Mission Linen industrial dry-cleaning plants in California and Arizona.
- Expert witness in mediation settlement of litigation over relative contributions to groundwater contamination by trichloroethylene (TCE), perchlorate, and *N*-Nitrosodimethylamine (NDMA) from municipal solid waste and aerospace industrial waste at a landfill in Rancho Cordova.
- Expert witness in insurance litigation at a groundwater contamination site that was formerly proposed for the National Priorities List.
- Designated expert witness in toxic tort litigation concerning Crazy Horse Landfill in Salinas, California.
- Designated expert witness in mediation among three successor operators of an aerospace manufacturing facility in Monrovia. The objective of the mediation was to determine the relative contributions of TCE, 1,1,1-trichloroethane, and 1,4-dioxane to groundwater by the various operators.

- Designated expert witness in litigation over mobility of arsenic at a landfill in Imperial County.
- Expert witness in litigation over historical impact of a service station in San Diego.
- Designated expert witness in litigation concerning alleged PCE contamination of a neighboring facility in Burbank.
- Expert witness in insurance litigation concerning relative contributions of PCE and TCE from manufacturing operations and a landfill at an RCRA facility in Noblesville, Indiana.
- Provided testimony in arbitration hearing regarding PCE contamination at a dry-cleaning site in Escondido.
- Provided expert deposition testimony in insurance litigation concerning TCE, PCE, and chromium contamination at a manufacturing facility in Huntington Park.
- Designated expert in insurance litigation over TCE contamination of groundwater at the West Osborn Complex in Phoenix, Arizona.
- Designated expert in litigation over causes of a landslide in Laguna Niguel.
- Provided expert deposition testimony on rainfall infiltration and migration in litigation over construction defects in housing development in Gilbert, Arizona.

Groundwater Supply and Development

- Evaluated water quality and quantity and regulatory and water rights issues as part of the due diligence for the acquisition of the Primm casinos and golf course in Nevada and California.
- Prepared a groundwater supply assessment for the Joshua Basin Water District including simulations of water level and storage declines in response to various demand growth scenarios. Evaluated recharge estimates, estimated storage, historical production and declines in groundwater levels and estimated both recharge from septic system discharges and water quality impacts associated with septic discharge. Identified potential sites for artificial recharge through capture of storm runoff and imported water.
- Designed and prepared well specification for a new production well for Joshua Basin Water District. Evaluated potential spreading basin locations for aquifer recharge with imported water.
- Evaluated potential impact of a new production well on water levels and pump submergence in existing wells, on seawater intrusion, and colored water migration in the Orange County groundwater basin for the Laguna Beach County Water District.
- Investigated the groundwater resources and sustainable yield of a 23,000 acre ranch in San Diego County. Work included exploration drilling, production well construction, and measuring rainfall, surface water runoff, changes in soil moisture, and changes in groundwater storage. Estimated infiltration, losses to evapo-transpiration to calculate recharge and sustainable yield through water balance analysis. Ecohydrology study evaluated water demands of native plant populations in upland and riparian areas. Project is ongoing.
- Investigated the groundwater resources and sustainable yield of a 25,000 acre ranch in San Barbara County. Work included measuring rainfall, changes in soil moisture, and changes in groundwater storage. Estimated infiltration, losses to evapo-transpiration to calculate recharge

and sustainable yield through water balance analysis. Ecohydrology study evaluated water demands of native plant populations in upland and riparian areas. Project is ongoing.

- Conducted resource evaluation and prepared groundwater management plan in accordance with AB3030, to develop groundwater resources in the Tijuana Valley. Designed a groundwater exploration program for the San Diego Formation which included the installation of two 1,400-foot deep observatory wells and a 1,200-foot deep production well.
- Evaluated impacts of increased production from the Dyer Road Well field for the Irvine Ranch Water District.
- Consulted with Suburban Water Systems to site and design two 1200 foot exploratory boreholes and two 1200 foot production wells. Prepared draft well specifications for driller bid packages, interpreted geophysical logs, designed well screen intervals, slot size and filter pack. Evaluated water quality analyses from zone testing to determine screen intervals.
- Prepared Groundwater Management Plan for Rainbow Municipal Water District. The plan addresses water quality impacts from agricultural and horticultural runoff and septic discharges as well as developing groundwater supply.
- Evaluated the potential impact of seepage of reclaimed water from the San Joaquin Reservoir for Irvine Ranch Water District. This evaluation included review of hydraulic properties of the reservoir liner and underlying formations and water quality impacts on the Newport Beach Back Bay.
- Evaluated the impact of future wastewater plant effluent discharges comprised of imported on the salinity of groundwater for the Ramona Municipal Water District. Prepared numerical models of the basin and a report to support a Basin Plan Amendment request from the Regional Water Quality Control Board.
- Prepared a numerical groundwater model to evaluate the impacts of increased discharge rates of wastewater effluent from the Rancho Santa Fe Water Pollution Control Facility in the San Dieguito Valley.
- Investigated development of groundwater supply from the Saugus Formation on the south flank of the San Gabriel Mountains. Designed and constructed one 700 foot deep well.
- Ibri-Dhank Investigation - Investigated quantity and quality of groundwater available in alluvial formations and Eocene/Paleocene limestone and dolomites beneath the foothills of the Jabal Akhdar and plains between the mountains and sand dunes of the Empty Quarter in the Sultanate of Oman. Responsible for review of existing hydrogeologic information, siting exploration wells, logging boreholes, designing wells, conducting aquifer tests, and relating data to existing hydrogeologic information. Constructed 12 wells to depths of 700 feet.
- Conducted a hydrogeologic exploration and resource evaluation of the Jabal Qara and Nadj Areas of Dhufar Province in the Sultanate of Oman which entailed selecting locations, drilling, and aquifer testing for 21 exploration wells to depths of 800 meters.
- Investigated hydraulic conductivity of dual porosity Miocene formations by means of packer testing, Salalah, Sultanate of Oman.
- Investigated seawater intrusion along the Salalah Coast, Sultanate of Oman.

GROUNDWATER / SURFACE WATER / HABITAT INTERACTION - ECOHYDROLOGY

- Ecohydrology study evaluated water demands of native plant populations in upland and riparian areas on a 23,000 acre ranch in San Diego County and the potential impact of groundwater development. Work included measuring rainfall, surface water runoff, changes in soil moisture, transpiration measurement, and logging plant species and numbers in gridded test cells. Estimated habitat water requirements by measuring changes in soil moisture and measuring sap flux. Project is ongoing.
- Ecohydrology study evaluated water demands of native plant populations in upland and riparian areas on a 25,000 acre ranch in Santa Barbara County. Work included measuring rainfall, surface water runoff, changes in soil moisture, and estimating transpiration. Estimated habitat water requirements by measuring changes in soil moisture. Project is ongoing.
- Evaluated seasonal water quantity and quality requirements of *cis-montane* alkali marsh on Newhall Ranch in Los Angeles County. Marsh grasses were sustained by brackish groundwater containing sulfate at concentrations up to 5,000 milligrams per liter. Work included installation and monitoring of shallow piezometers, slug testing to determine hydraulic properties of the soil, soil installation and monitoring of moisture probes, continuous groundwater level measurements and periodic water quality sampling.
- Evaluated seasonal water quantity and quality requirements of wetlands habitat on a 250,000 acre ranch in Los Angeles and Kern Counties. The study looked into potential seasonally varying sources of water to the wetlands and the potential impact of groundwater development. Work included installation and monitoring of shallow piezometers, soil moisture probes, continuous groundwater level measurements, periodic water quality sampling, isotope analyses, and spring discharge monitoring.
- Evaluated the potential affect of intercepting suburban runoff for nuisance nutrient treatment / reuse and the affect of expanding the acreage of the Gobenadora Ecological Restoration Area on groundwater elevations in Gobenadora Canyon and the potential impact on shallow-rooted plants in the restoration area.

GROUNDWATER MODELING

- Simulated migration of TCE in south Archibald Plume in Ontario, CA to evaluate potential remedial responses and impacts of further migration.
- Conducted model simulations of the potential impact of various growth scenarios on groundwater supplies for the Joshua Basin Water District. Results of these simulations aided District in the decision to import water to enhance recharge.
- Performed vadose zone and groundwater modeling of a PCE release for AC Products in OCWD v. *Northrup* litigation over groundwater contamination with PCE, TCE, 1,4-dioxane, and perchlorate.
- Developed solute transport model of a glacial outwash aquifer with complex surface water/ groundwater interaction. Simulations included the replicating fate of VOCs degraded by reductive dehalogenation.

- Prepared coupled vapor transport and groundwater transport models of VOC releases from landfills in California and Indiana.
- Participated in the preparation of a finite element model of the San Gabriel Basin that was used to design a groundwater remedy in the Baldwin Park Operable Unit of the San Gabriel Valley Superfund sites.
- Prepared three-dimensional density-driven flow model of the Tijuana River Valley to evaluate seawater intrusion groundwater development alternatives and groundwater recharge using reclaimed water and injection wells.
- Prepared a groundwater model to simulate the affects of increased infiltration at a wastewater plant in Rancho Santa Fe, California.
- Prepared groundwater model of the San Dieguito Valley to evaluate the effectiveness of coordinated groundwater pumping and reclaimed water recharge in reversing saltwater intrusion.
- Prepared a solute transport model of a layered alluvial aquifer system to design groundwater remediation at a wood treating facility in the Central Valley.
- Prepared a solute transport model of a layered alluvial aquifer system to design groundwater remediation at the Kearney KPF facility on Stockton, California. This model was also used to evaluate the relative contributions of various sources to groundwater contamination in support of insurance litigation.
- Prepared solute transport model of vadose zone and groundwater at West Osborn Complex in Phoenix, Arizona.
- Prepared groundwater model to simulate the impact of additional groundwater withdrawals from the Dyer Road well field, Orange County, California for Irvine Ranch Water District.
- Prepared model to simulate the potential impact of a new production well in Fountain Valley, California for Laguna Beach County Water District.

Cost Allocation

- Prepared model to allocate costs among PRPs in Baldwin Park Operable Unit of San Gabriel Valley Superfund sites. Participated in remedy-driven allocation of costs based on unique treatment costs for perchlorate, NDMA, 1,4-dioxane, and volatile organic compounds (VOCs).
- Participated in allocation mediation for the El Monte Operable Unit of the San Gabriel Valley Superfund sites, including the impacts of VOCs, chromium, perchlorate, and NDMA from 15 facilities on potential remedy costs.
- Participated in allocation mediation of North Glendale Operable Unit of the San Fernando Valley Superfund sites.
- Evaluated the potential contribution of Bradley Landfill to groundwater contamination in the North Hollywood Operable Unit of the San Fernando Valley Superfund Sites and presented rationale for an appropriate allocation to EPA.

- Evaluated the potential contribution of Site A to groundwater contamination in the Operable Unit 2 of the Omega Superfund Site, presented evaluation to EPA, and prepared rationale for an appropriate allocation.
- Participated in cost allocation discussions among PRPs at the BKK Landfill.
- Participated in the preparation of cost-allocation models for the Stringfellow Acid Pits Superfund site.

Soil and Groundwater Contamination Studies

- Designed and directed investigation of groundwater contamination by VOCs at manufacturing facilities, including aerospace, electric-component, and dry-cleaning establishments, located in California and Texas.
- Designed and implemented in situ remediation pilot studies to destroy VOCs at two electric-component manufacturing facilities in Newport Beach, California. These field studies employed both ethanol-stimulated reductive dechlorination and oxidation using potassium permanganate.
- Investigated soil and groundwater contamination at a PRP facility in the Glendale North Operable Unit of the San Fernando Valley Superfund sites.
- Investigated soil and groundwater contamination by TCE, PCE, perchlorate, NDMA, 1,4-dioxane, and carbon tetrachloride in the Baldwin Park Operable Unit of the San Gabriel Valley Superfund sites. Also provided technical oversight of groundwater modeling for the BPOU Steering Committee.
- Investigated TCE contamination of soil and groundwater at the former Hughes facility in Fullerton, CA.
- Investigated soil and groundwater contamination at a pesticide-applicator facility in San Diego. Work performed included preparing a hydrogeologic assessment report for submission to the Regional Water Quality Control Board (RWQCB).
- Investigated the integrity of hazardous waste surface impoundments at a state Superfund site in El Centro. Work performed included providing technical assistance in negotiating Consent Decree with California Department of Health Services, designing and conducting a remedial investigation/ feasibility study, and performing closure of surface impoundments in accordance with Toxic Pits Cleanup Act and Consent Decree.
- Designed a program to monitor groundwater contamination by solvents, fuels, and metals involving 104 monitor wells at a manufacturing facility in Texas.
- Prepared closure plan for municipal landfill for the Hualapai Nation, Peach Springs, Arizona.

Remedial Design and Implementation

- Prepared feasibility study evaluating water supply and remedial alternatives to address the South Archibald Plume for the City of Ontario.
- Designed and implemented remediation of PCE and TCE in vadose zone in Burbank. No Further Action letter issued.
- Designed and implemented a pump-and-treat groundwater remediation to treat VOC-contaminated groundwater at a manufacturing facility in California. Designed and implemented a soil vapor extraction to remediate VOC-contaminated soil.
- Designed and implemented soil remediation and groundwater remediation technologies, including the injection of treated groundwater and modification to municipal well field pumpage patterns, to facilitate remediation at an electronic component facility in Stockton.

- Designed enhanced in situ bioremediation of groundwater contaminated with chlorinated solvents.
- Designed and implemented soil remediation technology at a pesticide-operation facility located in Southern California.
- Designed and implemented a remedial investigation of chromium contamination and designed and installed a remedial well field at the Marley Cooling Tower Company Superfund site in Stockton.
- Revised soil vapor extraction well network and obtained closure for soil and groundwater at the former Lonza pharmaceutical plant in Huntington Park, CA.
- Obtained soil closure for the AC Products site in Placentia, CA.

Underground Storage Tank Investigations

- Advised the City of Seal Beach on the adequacy of the investigation of groundwater, soil, and vapor contamination emanating from a service station within the City. Evaluated Corrective Action Plans prepared by the service station owner, advised the City and submitted comments to Orange County Health Care Agency. Participated in community meetings and city council meetings.
- Investigated tank integrity and designed and installed continuous leak detection system using vapor detection for 20 underground storage tanks (USTs) at the Hughes Aircraft Facility in Los Angeles.
- Developed and implemented work plan to close underground fuel storage tanks and investigate potential leakage at an aerospace manufacturing facility located in Los Angeles.
- Investigated an 11,000-gallon gasoline leak from a UST and remediated free product and contaminated groundwater and soil located in Los Angeles.
- Investigated soil contamination resulting from leakage of solvents at an aerospace manufacturing facility in Torrance.
- Investigated groundwater contamination resulting from gasoline and diesel leakage from USTs in Encinitas.
- Investigated groundwater contamination resulting from gasoline and diesel leakage from USTs in El Centro.
- Investigated groundwater contamination resulting from gasoline leakage from USTs in San Diego.

Environmental Assessments

- Conducted environmental due diligence review of eight theme parks in California, Florida, Spain, Japan, and China for potential acquisition.
- Conducted environmental due diligence review of 13 casino properties in Nevada, Illinois, Michigan, and Mississippi for an acquisition transaction.
- Evaluated the results of an environmental investigation of soil contamination and proposed bioremediation of former oilfield, gas plant, and refinery located in Santa Fe Springs.
- Designed and conducted an environmental assessment of an agricultural site located in Riverside for possible dichlorodiphenyltrichloroethane (DDT) and fuel contamination.
- Directed environmental assessment and compliance audit of electronic component manufacturing facilities in Newhall, California, and Tijuana, Mexico.

- Conducted environmental assessment of six aerospace industrial properties in California, Utah, Massachusetts, and Canada for a single real estate transaction.

Injection Wells/Oil Well Abandonment

- Designed, constructed, and operated a 350 GPM injection well in the Central Valley of California.
- Abandoned a 1923 oil well in Inglewood to current standards to allow development of property for commercial buildings.

Publications

Peng Wang, Peter Quinlan, and Daniel M. Tartakovsky, 2009. *Effects Of Spatio-Temporal Variability Of Precipitation On Contaminant Migration In The Vadose Zone*. GEOPHYSICAL RESEARCH LETTERS, VOL. 36. 20 June 2009.

D'Lugosz, J.J., P.T. Quinlan, and R.J. Dingman. 1983. *Results of Test Drilling in the Ibri Area*. Sultanate of Oman: Public Authority for Water Resources.

Quinlan, P.T. 1982. *Climatic Change and Water Availability in the Rio Grande and Pecos River Basins*. Master's thesis. Tucson, Arizona: University of Arizona.

Presentations

Quinlan, P.T. "Recharge in a Desert Basin – How Important Are Return Flows from Septic Systems?" Groundwater Resource Association meeting. September 2006.

Daniel B. Stephens, Farag E. Botros, Stanley Helenschmidt, Bill Casadevall, Peter Quinlan, and Daniel Davis. "The Importance of Hydrogeologic Characterization and Analysis to Avoid Off-site Impacts in Highway Construction". ASCE 2012.

Quinlan, P.T. "The Importance of Basic Principles in Determining the Representativeness of Monitoring Well Data". Departmental Seminar, University of Arizona Department of Hydrology and Water Resources, March 2012.

Quinlan, P.T. "Application of a Watershed Model in Water Balance Estimate of Recharge", Guest Lecture, UCSB 2012.

Advisory Committees

Industry Advisory Committee to Department of Aerospace, Mechanical, and Environmental Engineering, University of California at San Diego

Department Advisory Committee, Department of Hydrology and Water Resources, University of Arizona

