

## **Chad N. Taylor, PG, CHG**

**Vice President and Principal Hydrogeologist**

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### **EDUCATION**

BS, Earth Sciences, University of California Santa Cruz, 1999

### **REGISTRATIONS**

Professional Geologist California, No. 8443  
Certified Hydrogeologist California, No. 915

**YEARS WITH TODD GROUNDWATER: 16**

### **PROFESSIONAL SUMMARY**

Chad Taylor is a licensed Professional Geologist and Certified Hydrogeologist with over 20 years of experience in sustainable groundwater basin management, groundwater characterization and conceptual hydrogeologic model development, groundwater supply exploration and development, and protection of groundwater resources. Mr. Taylor brings practical working experience with groundwater development and investigation including hydrogeologic studies and aquifer testing, monitoring network design and monitoring well installation, and design and installation of water supply wells, typically in the context of basin management. He also brings extensive experience with the development and analysis of large and complex datasets and with application of numerical groundwater models. Mr. Taylor regularly works for public and private sector clients—including water districts, city and county governments, and landowners—and is skilled in communicating technical concepts to clients and the public. Since the 2014 passage of the Sustainable Groundwater Management Act (SGMA), Mr. Taylor has assisted multiple water agencies with preparation for SGMA and has helped prepare six groundwater sustainability plans (GSPs), with lead project management roles on three GSPs. He has been instrumental in SGMA implementation including annual assessment of groundwater conditions, monitoring program improvements, reporting and investigations supporting Aquifer Storage and Recovery (ASR). His work in basin management goes beyond SGMA planning to include managed aquifer recharge (MAR) and FloodMAR and indirect potable reuse (IPR) of recycled water through injection.

Mr. Taylor has participated in planning and management for two adjudicated basins, Antelope Valley and the Northern Cities portion of Santa Maria Valley. This has included not only hydrogeologic data analysis but participation in establishing rules, regulations, and procedures for metering groundwater production and implementation of the metering program.



## **Groundwater Basin Management**

### *Antelope Valley Watermaster Engineer, Kern, Los Angeles, and San Bernardino Counties*

Mr. Taylor is part of the Todd Groundwater team serving as the Watermaster Engineer for the adjudicated Antelope Valley Groundwater Basin. The Antelope Valley Groundwater Basin was adjudicated by the courts in December 2015. Duties and responsibilities of the Watermaster Engineer were developed in accordance with the Judgment, and in 2017 Todd Groundwater initiated implementation of the Judgment. Mr. Taylor assisted in establishing the rules, regulations, procedures, and working relationships that serve as the foundation for implementation of the Judgment into the future. Mr. Taylor led the development of the Rules and Regulations for metering groundwater production in cooperation with the Watermaster Advisory Committee and Board. He continues to administer implementation of meter installation and documentation, including coordination for meter installation. He assisted in the development of annual analysis and reporting protocols, including definition of the groundwater contouring and groundwater storage calculation methodology. He continues to contribute to annual reporting. This work will serve as the foundation of successful groundwater management of the adjudicated basin.

### *Santa Maria Groundwater Basin Adjudication and Subsequent Management, Northern Cities, San Luis Obispo County*

Todd Groundwater was retained by legal counsel for San Luis Obispo County and the Northern Cities (Cities of Arroyo Grande, Pismo Beach, and Grover Beach, and Oceano Community Services District) to provide technical support in the Santa Maria Groundwater Basin adjudication. The Judgment was posted in early 2008. Mr. Taylor's contribution focused on hydrogeologic aspects. After the Judgment, he helped develop the outline and procedures to produce Annual Reports and participated in the first Annual Report for the Northern Cities Management Area. This involved collaboration with the adjoining Nipomo Mesa Management Area to ensure consistent methodologies and findings across the shared boundary. He also was involved in investigation of seawater intrusion conditions; this involved review of available groundwater level and groundwater quality data, a successful search for previously lost DWR sentry wells along the coast, and refurbishment and sampling of the sentry wells as part of a groundwater monitoring program.

### *Sustainable Groundwater Management, San Benito County Water District*

San Benito County Water District actively manages groundwater resources in the North San Benito Basin (formerly the San Juan, Bolsa, Hollister, and Tres Pinos Valley basins). Mr. Taylor has served as the Project Hydrogeologist for the District for many years, assisting them with a variety of groundwater management projects. With passage of SGMA in 2014, the District initiated SGMA planning, which has included evaluation of groundwater basin boundaries and a successful application for consolidation of the four groundwater basins. As of 2018, the District has become a GSA, secured grant funding for GSP preparation (with Todd Groundwater assistance), and progressed with GSP planning. Mr. Taylor also prepared and coordinated the application to consolidate the four previously defined groundwater basins into the newly formed North San Benito Basin. This change allowed the District to prepare a single GSP to characterize and plan for sustainable management. Without consolidation the District would have been responsible for GSPs for each basin. Mr. Taylor led the development

of a unified hydrogeologic conceptual model of the newly consolidated basin and worked closely with District staff to evaluate and update their groundwater monitoring program. He also led development of the sustainable management criteria for water levels in the complex and dynamic Basin. Mr. Taylor was an integral part of the Todd Groundwater team that prepared the Basin GSP in coordination with the GSA and their Technical Advisory Committee (TAC). Mr. Taylor gave presentations at public workshops for the TAC and stakeholders and provided technical support to other outreach efforts. The GSP was submitted in early 2022 and received regulatory approval from DWR in the summer of 2023.

*Sustainable Groundwater Management, City of Corona*

Todd Groundwater prepared the City of Corona groundwater management plan, which was adopted in 2008, and has been providing on-call hydrogeologic support to the City for nearly 20 years. Mr. Taylor has provided hydrogeologic expertise to the City on a variety of projects, including initial SGMA compliance. Mr. Taylor has assisted the City in modifying the Temescal and Bedford-Coldwater basin boundaries, forming a Groundwater Sustainability Agency (GSA), and securing a grant from the State for preparation of a Groundwater Sustainability Plan (GSP) for the Temescal Basin. He served as Project Manager and Hydrogeologist for a successful effort undertaken collaboratively by the City of Corona, Elsinore Valley Municipal Water District, and Temescal Valley Water District to modify groundwater basin boundaries consistent with SGMA. The former boundaries were revised to align with mapped alluvial deposits to accurately reflect the groundwater system. The modification also included division of the Elsinore Basin to create two subbasins—the Elsinore Valley Subbasin and Bedford-Coldwater Subbasin. The boundary modification requests were submitted to DWR based on scientific and jurisdictional rationale; DWR approved the basin boundary modification.

*GSP Preparation for Temescal Basin, City of Corona GSA, Riverside County*

Mr. Taylor led the preparation of the GSP for the medium priority Temescal Basin on behalf of the City of Corona. This included documentation of the complex hydrogeology of the Basin and its principal Channel Aquifer, evaluation of current and historical groundwater conditions, assessment of interconnected surface water, development of a new numerical model for the Basin, establishment of sustainability criteria, and planning for long-term groundwater sustainability. The GSP was developed in coordination with the City of Corona and their local municipal water supply partners, the City of Norco and Home Gardens County Water District. Mr. Taylor led the extensive stakeholder outreach program and was the lead presenter at a series of public Technical Advisory Committee meetings and stakeholder workshops. The stakeholder workshops were broadcast on multiple media streams and presented simultaneously in both English and Spanish, with live real-time translation. Implementation of the GSP involves continuation of existing projects and management actions (e.g., groundwater treatment, wastewater percolation, water conservation) and new projects (e.g., shallow monitoring well installation and a potable reuse feasibility study). Mr. Taylor serves as Principal Hydrogeologist for annual reporting and other implementation activities.

*SGMA Support and GSP Preparation for Bedford-Coldwater GSA, Riverside County*

Mr. Taylor has provided SGMA support and hydrogeologic services for the newly created Bedford-Coldwater Subbasin, which is managed collaboratively by a Joint Powers Authority of the City of Corona, Elsinore Valley Municipal Water District, and Temescal Valley Water

District. While designated as very low priority basin, Bedford-Coldwater is situated between the Temescal and Lake Elsinore basins and all three are hydrologically connected. Hence, local agencies chose to prepare a GSP for this small but strategic basin. Mr. Taylor served as the Project Manager and Hydrogeologist for preparation of the GSP. This work included collecting, compiling, and organizing available data from numerous sources for preparation of a Data Management System (DMS) to support the GSP. Mr. Taylor worked with the GSA and their administrators to collect available water supply, wastewater, hydrologic, hydrogeologic, and climate data from public and agency sources. These data were compiled into unified database and geodatabase formats and comprehensively documented for future use. Mr. Taylor also led Todd Groundwater's team in refinement of the hydrogeological conceptual model, preparation of the first modern groundwater model of the Basin, assessment of current and historical groundwater conditions, development of comprehensive and detailed groundwater and surface water budgets, estimation of sustainable yield, and development of sustainable management criteria. The GSP was adopted by the Bedford-Coldwater GSA in late 2021 and submitted to DWR in early 2022.

*GSP Preparation for the Elsinore Valley GSA, Riverside County*

Todd Groundwater teamed with Carollo Engineers for this GSP, with Mr. Taylor serving as lead Hydrogeologist. In this capacity, Mr. Taylor led the creation of the first hydrogeologic conceptual model covering the entire Elsinore Valley Subbasin including not only the Elsinore Hydrologic Area, but Warm Springs and Lake Lee Hydrologic Areas as well. This involved development of hydrogeologic cross-sections for this geologically complex area and definition of recharge and discharge areas. Although data were limited, water table contour maps were created for the entire subbasin. Mr. Taylor also contributed to assessment of current and historical groundwater conditions, construction of a new groundwater model simulating the complete basin, re-evaluation of sustainable yield, and planning for maintenance of the Subbasin's long-term sustainability. Ongoing projects involve supply well replacements and conjunctive use of local groundwater with imported water.

*Simi Valley Groundwater Supply Development Feasibility Study, County Waterworks District No. 8, City of Simi Valley*

In 2016 Todd Groundwater prepared a basin characterization study to assess the potential for developing groundwater resources in the Simi Valley Basin. In a subsequent 2018 feasibility study, Mr. Taylor was the Project Hydrogeologist for an evaluation of potential new groundwater production from the Basin. His work included evaluation of hydrogeology and land use to identify 19 potential well sites to help meet anticipated future groundwater supply requirements. Recognizing poor groundwater quality conditions, these sites were assessed for water treatment and conveyance requirements. To assist the District in planning, detailed plans and cost estimates were prepared and future regulatory and monitoring requirements were identified. Subsequently groundwater development was deferred because of public concern over the documented poor quality.

*GSP for Kern River GSA, Kern County*

The Kern River Groundwater Sustainability Agency (GSA) encompasses the service areas of the City of Bakersfield, Kern Delta Water District, and the Kern County Water Agency Improvement District Number 4. The GSA was one of the first in the high-priority Kern County

Subbasin—an area with intensive groundwater demand, significant groundwater management including water banking, and important challenges. Mr. Taylor was Project Hydrogeologist on the team that prepared the GSP for the Kern River GSA, which was submitted to DWR in 2020. For this effort, Mr. Taylor formulated a conceptual model of the GSA area, provided technical support for regional groundwater modeling and water balance calculations, and helped prepare the GSP report.

*Warner Valley Groundwater Basin Assessment, Vista Irrigation District, San Diego County*

Mr. Taylor served as Project Hydrogeologist and Project Manager for multiple projects for the Vista Irrigation District (VID) in the Warner Groundwater Basin. Initially, Todd Groundwater was retained to perform a groundwater assessment of the Warner Valley. VID is the largest landowner and water user in the Basin, located in the interior mountains of northern San Diego County. VID also owns and operates Lake Henshaw Dam and Reservoir at the downgradient end of the Basin, which serves as a reservoir for groundwater that VID pumps into the lake to serve customers in VID's service area, which includes the City of Escondido (City) and other smaller users along the San Luis Rey River. In 2021 VID and the City initiated this study of Warner Basin groundwater to improve estimates of existing and potential future yield and to evaluate the effects of proposed increases in pumping by the other major Basin user, Warner Springs Ranch Resort (WSRR). The scope of the investigation included an updated analysis of Basin hydrogeology, development of a numerical groundwater flow model, and simulation of scenarios including climate change, increased WSRR pumping and increased VID pumping. Mr. Taylor led the effort to collect data and prepare a detailed hydrogeologic model of the Basin. He is currently working with VID and the project team to evaluate the potential for increased groundwater production.

**Managed Aquifer Recharge and Recycled Water Projects**

*Pure Water Monterey Groundwater Replenishment Project, Monterey One Water*

The Pure Water Monterey project is replenishing the Seaside Groundwater Basin by injecting advanced treated recycled water for indirect potable reuse (IPR). Todd Groundwater has been involved since 2010 in planning and implementation of this award-winning project, providing technical support to planning, numerical modeling, and regulatory compliance and conducting an extensive field program with installation, testing, and sampling of four injection wells and development of a monitoring program with numerous monitoring wells. As of 2023, Pure Water Monterey is embarking on installation of the fifth and sixth injection wells. Mr. Taylor has served as a Project Hydrogeologist with contribution to design of deep injection wells and monitoring wells and planning for drilling and construction of the well facilities. The latest phase involves recharge impacts analysis, groundwater modeling, tracer studies, and reporting for regulatory compliance; Mr. Taylor is serving as Todd Groundwater Principal.

*Accelerated Drought Response Project (ADRoP) for San Benito County Water District (SBCWD)*

ADRoP is the accelerated phase of an Aquifer Storage and Recovery (ASR) project in the North San Benito Groundwater Basin (Basin). Mr. Taylor served as Project Manager for the Managed Aquifer Recharge study (funded by a DWR Sustainable Groundwater Management grant) that identified injection wells and ASR as preferred options for Basin storage of available Central Valley Project water. He also managed subsequent exploration of alternative ASR sites

through programs of depth-discrete groundwater quality sampling and siting, design, drilling and testing of exploratory borings. He currently is serving as Project Hydrogeologist for the design phase of this project, which involves finalizing and assessing ASR well locations, providing CEQA and permitting support, preparing well designs and technical specifications, contractor bid phase support, and public outreach. Mr. Taylor also has supported SBCWD funding applications for ADROp, providing his technical expertise and his knowledge of Basin hydrogeology and management. In 2022 SBCWD applied for project construction grant funds through the DWR Sustainable Groundwater Management (SGM) program; as of 2023 the ADROp has been recommended by DWR to receive a grant award of \$11 million.

*IPR Groundwater Studies, Valley Water (previously Santa Clara Valley Water District)*

Since 2015 Todd Groundwater has been working with Valley Water on groundwater investigations for Indirect Potable Reuse (IPR) projects to recharge highly treated recycled water to the Santa Clara Plain Subbasin. Mr. Taylor has served as Project Hydrogeologist and Task Leader for a study to site IPR wells and to assess regulatory compliance and potential water quality impacts to groundwater of IPR recharge (both spreading and injection). Mr. Taylor led the development of a geographically enabled basin-wide hydrogeologic conceptual model and assisted in refinement of Valley Water's groundwater flow model. These tools were used to predict travel times to nearby supply wells, assess mounding from groundwater recharge, and help site the IPR facilities. Mr. Taylor has also led field programs to site and evaluate new recharge facilities, and construct monitoring facilities. Mr. Taylor has designed and is coordinating the installation of a series of nested groundwater monitoring wells designed to track recycled water at various depths in the subsurface. He has also led the field testing of two prospective surface spreading recharge facilities, including long-duration managed infiltration tests using constant head test infiltration basins to assess recharge rates and vadose and subsurface flow of infiltrated water. The project also includes dissolution studies and geochemical analysis of potential effects of recharging advanced treated water in the specific selected locations.

*Ogier Ponds Aquifer Recharge Feasibility Study, Coyote Valley, Valley Water*

As Project Hydrogeologist, Mr. Taylor completed a hydrogeologic investigation of the recharge potential of the Ogier Ponds adjacent to Coyote Creek in Santa Clara County. The ponds were created by a former sand and gravel operation and are currently used for recreation. Mr. Taylor designed and led a field investigation including surface geophysical surveys, pond and stream gaging, and well drilling and testing that was conducted to evaluate the compatibility of recreational use and managed recharge at the site. The creek historically ran adjacent to the ponds, but during a high flow event the berm between the two was breached leading to the belief that the creek was feeding the ponds. However, review of aerial photographs and findings from the field study demonstrated that the ponds are fed by a shallow groundwater system. The site was deemed unsuitable for managed aquifer recharge due to the high groundwater table.

*Modeling of Groundwater Banking Projects, Kern County Water Agency*

Mr. Taylor served as Project Hydrogeologist for the 2012-2018 evaluation of groundwater banking operations in Kern County. This project involved development of a comprehensive groundwater model to assess the effects of the largest groundwater banking project in the



world. Mr. Taylor developed a conceptual model of the project area utilizing all existing sources of geologic, hydrogeologic, and hydraulic data, assisted in the development of a comprehensive water balance detailing the inflow and outflow to the project area, and assisted with construction of a complex transient three-dimensional groundwater flow model of the system. The water balance included calculation of agricultural, municipal, industrial, and groundwater banking activities. The transient numerical model covers a period of over 20 years and has been calibrated to closely simulate groundwater conditions in the Kern River Fan area through variable historical hydrologic conditions. The calibrated model has been thoroughly reviewed and used to simulate groundwater conditions without local groundwater recharge and banking project contributions.

*Sustainable Water Management Strategy and In-Field Recharge Feasibility Study for Specialty Crop Expansion in the SACOG Portion of the Sacramento Valley*

Mr. Taylor served as the Todd Groundwater Project Manager and Lead Hydrogeologist for the Sacramento Area Council of Governments (SACOG) 2018 evaluation of the feasibility of in-field recharge on specialty crop fields in the SACOG area. SACOG is an association of local governments in the six-county Sacramento Region of El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba counties and the 22 cities therein, and provides planning and funding. SACOG received grant funding from the California Department of Food and Agriculture to evaluate the feasibility of recharging groundwater on specialty crop agricultural lands within the SACOG area. Mr. Taylor worked with SACOG and planning consultants to review the hydrogeologic setting of the SACOG area and to identify the hydrologic and hydrogeologic factors important to the recharge assessment. He also analyzed potential increases in recharge volume and mounding resulting from future in-field recharge. This work resulted in the development of a spatial representation of subsurface suitability for surficial recharge throughout the SACOG area. The subsurface suitability spatial dataset was combined with surficial and water availability information to produce an overall feasibility mapping tool that can be used to identify candidates for in-field recharge.

*South Bay Water Recycling, City of San Jose and Santa Clara Valley Water District*

Mr. Taylor served as the Project Hydrogeologist for the evaluation of physical and water quality impacts related to recycled water irrigation in the City of San Jose. This project was designed to assess potential impacts of irrigation with advanced-treated recycled water in Santa Clara County. Mr. Taylor collected and compiled an extensive database of groundwater elevation and quality data for wells in and around the properties on which recycled water is used for irrigation. In addition, Mr. Taylor assisted with a comprehensive technical analysis of South County hydrogeologic conditions and assessed potential degradation of native groundwater from applied recycled water. The City, Santa Clara Valley Water District (now Valley Water), and the Regional Water Quality Control Board were concerned about water quality issues in major potable-water aquifers, potential impacts on downstream production wells, and the potential for interference with the water supply and flood control programs. The comprehensive hydrogeologic and geochemical assessment prepared by Mr. Taylor and the Todd Groundwater team has helped to mitigate these concerns.



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## SCHEDULE OF CHARGES: 2024

Title	Name	Hourly Rate
President	Iris Priestaf	\$300
Principal Geologist/Vice President	Phyllis Stanin	\$300
Principal Hydrogeologist/ Vice President	Chad Taylor	\$290
Principal Hydrogeologist	Michael Maley	\$290
Principal Engineer	Maureen Reilly	\$275
Principal Hydrogeologist	Liz Elliott	\$275
Consulting Hydrogeologist	Sally McCraven	\$290
Senior Hydrogeologist	Dan Craig	\$290
Senior Hydrologist	Gus Yates	\$285
Senior Hydrogeologist	Brent Johnson	\$210
Consulting Engineer	Katherine White	\$275
Consulting Modeler	Walt McNab	\$250
Associate Engineer	Lindsay Hall	\$225
Associate Engineer	Sebastien Poore	\$210
Associate Geologist	Arden Wells	\$185
Staff Geologist	Garrett Erickson	\$175
Staff Geologist	Nicole Grimm	\$160
Staff Geologist	Edward Potts	\$160
Staff Geologist	Evan Bosinger	\$155
Senior Data Analyst/Graphics	Michael Wottrich	\$175
Office Manager	Cynthia Obuchi	\$155

### **Rates are subject to adjustment in January**

#### **Travel Time**

*Travel time will be charged at regular hourly rates.*

#### **Litigation, Depositions, and Testimony**

*Deposition and trial testimony are charged at twice hourly rates.*

#### **Outside Services**

*All services not ordinarily furnished by Todd Groundwater, including printing, subcontracted services, local mileage, travel by common carrier, etc. are billed at cost + 15%. Local mileage is billed at the current Federal mileage rate.*



# TONY MORGAN

## CA PG #4178 / CA CHG #159

### EDUCATION & SPECIALIZED TRAINING

- Indiana University, Bloomington, Indiana, 1984, MA-Geology (Quaternary Geology Specialization with Hydrogeology and Geotechnical Engineering Minors)
- Indiana University, Indianapolis, Indiana, 1979, BS-Geology (Specialization in Hydrogeology and Quaternary Geology)
- OSHA Site Safety Supervisor Training for Hazardous Waste Operations (8-hour course), 1989
- OSHA 40--Hour Hazardous Waste Site Operations Training (HAZWOPER), 1987
- HAZWOPER Annual Updates 1987-2008
- Technical Assistance Team (TAT) and Emergency Response Training (16-hour course), 1988
- Paleoseismicity and Active Tectonics, Geological Society of America Short Course, 1987
- Archaeological Geology: Environmental Siting and Material Usage, Geological Society of America Penrose Conference

### PROFESSIONAL REGISTRATIONS & CERTIFICATIONS

*Professional Geologist, California, No.4178*

*Certified Hydrogeologist, California, No.159*

### PROFESSIONAL EXPERIENCE SUMMARY

- Daniel B. Stephens and Associates, Inc. (a Geo-Logic Company), Vice President - Principal Hydrogeologist - Market Leader for Water Planning and Development
- Groundwater Strategies, Inc. - Principal Hydrogeologist
- United Water Conservation District - Deputy General Manager for Groundwater & Water Resources
- Layne GeoSciences & COLOG Group, Layne Christensen Company - Manager Western Region
- California State University, San Bernardino - Instructor for Hydrogeology
- Quaternary Investigations, Inc. - Principal / Hydrogeologist
- ICG Hydrotech, Inc. - Office Manager / Associate Geologist
- Ecology & Environment, Inc. - Chief Hydrogeologist
- Tetra Tech, Inc. - Senior Hydrogeologist
- URS-Berger - Staff Geologist
- Earth Technology Corporation - Staff Geologist

<p><b>DANIEL B. STEPHENS AND ASSOCIATES, INC.</b></p> <p><b>(A GEO-LOGIC COMPANY)</b></p> <p><b>SANTA BARBARA, CA</b></p> <p><i>Vice President</i></p> <p><i>Principal Hydrogeologist</i></p> <p><i>Market Leader - Water Planning and Development</i></p> <p><i>2018 - present</i></p>	<p>Corporate lead for <i>Water Planning and Development</i> market across eight western States. Consultant for water supply, water management, and hydrogeological programs for municipal, industrial, and agricultural applications. Experienced with technical activities such as:</p> <ul style="list-style-type: none"> <li>✓ Sustainable Groundwater Management Act (SGMA) compliance activities (e.g., formation of Groundwater Sustainability Agencies [GSAs], creation of Groundwater Sustainability Plans [GSPs], groundwater basin studies);</li> <li>✓ Oversight of basin-wide groundwater elevation and water-quality monitoring programs;</li> <li>✓ Development of basin-scale hydrostratigraphic models for use in groundwater flow models;</li> <li>✓ Design of surface geophysical (e.g., CSAMT, TDEM, resistivity, and gravity) exploration programs for groundwater resource and sea-water intrusion evaluations;</li> <li>✓ Acquisition and interpretation of borehole geophysical logs;</li> <li>✓ Oversight of development, calibration, and documentation of basin-scale groundwater flow models;</li> <li>✓ Evaluation of water-quality data for potable and irrigation suitability;</li> <li>✓ Directing exploration activities to identify new or underutilized groundwater resources;</li> <li>✓ Siting and design of new potable and irrigation water supply wells; and</li> <li>✓ Technical oversight of aquifer replenishment activities (i.e., surface water diversions, spreading basins).</li> </ul> <p>Experienced with administrative/management activities such as:</p> <ul style="list-style-type: none"> <li>✓ Development of project scopes of work, bid specifications, and budgets;</li> <li>✓ Contract negotiations with specialty subcontractors and consultants (e.g., drillers, geophysicists, modelers, geochemists) and clients;</li> <li>✓ Technical and business development presentations;</li> <li>✓ Management of teams of hydrogeologists, groundwater modelers, surface water hydrologists, and technicians to achieve project, agency, or firm goals;</li> <li>✓ Management of multi-disciplinary teams of hydrogeologists, engineers, environmental scientists, and drillers;</li> <li>✓ Project management to accomplish technical, schedule, and fiscal guidelines; and</li> <li>✓ Administrative tasks associated with personnel management (e.g., time and expense tracking, performance evaluations, staff mentoring).</li> </ul>
<p><b>GROUNDWATER STRATEGIES, INC.</b></p> <p><b>VENTURA, CA</b></p> <p><i>Principal Hydrogeologist</i></p> <p><i>2018</i></p>	<p>Consultant to groundwater management programs for industrial and agricultural applications:</p> <ul style="list-style-type: none"> <li>✓ Sustainable Groundwater Management Act (SGMA) compliance activities (e.g., formation of Groundwater Sustainability Agencies [GSAs], creation of Groundwater Sustainability Plans [GSPs], groundwater basin studies)</li> </ul>

<p><b>UNITED WATER CONSERVATION DISTRICT, SANTA PAULA, CA</b></p> <p><i>Deputy General Manager for Groundwater &amp; Water Resources</i></p> <p>2014-2018</p>	<p>Direction of District's groundwater supply and aquifer replenishment activities and general water resource planning tasks. Lead person for compliance with Sustainable Groundwater Management Act and directing the District's role in the formation of Groundwater Sustainability Agencies (GSAs) in three groundwater basins including coordination of the District's role with the Fox Canyon Groundwater Management Agency / GSA. Served as District's representative on groundwater or water resource matters before various entities (e.g., Fox Canyon Groundwater Management Agency, Ventura County Farm Bureau, CA Department of Water Resources, Association of CA Water Agencies, Groundwater Resource Association of CA, local municipalities and agricultural groups, and various other stakeholders). Litigation support team member. Lead project proponent for the proposed development of the South Oxnard Plain Brackish Water Treatment Plant, Piru solar power array, and Fillmore-Piru Basin Water Banking program. Served on several groundwater/water resource advisory committees including:</p> <ul style="list-style-type: none"> <li>▪ <b>Technical Advisory Group (TAG)</b> for Groundwater Sustainability Plan development for four basins in support of the Fox Canyon Groundwater Management Agency/GSA</li> <li>▪ <b>Technical Advisory Committee (TAC)</b> – United Water Conservation District representative to Santa Paula Basin adjudication</li> <li>▪ <b>Joint Powers Agreement Negotiation Team</b> - United Water Conservation District representative in the negotiations to create JPAs to form the Mound Basin GSA and the Fillmore and Piru Basins GSA</li> <li>▪ <b>Acting Lead Technical Staff</b> – Served as lead technical staff to the Fillmore and Piru Basins GSA</li> <li>▪ <b>ACWA Groundwater Committee</b> – Agency representative to Association of California Water Agencies Groundwater Committee</li> <li>▪ <b>Watershed Coalition of Ventura County</b> – Agency representative to the Steering Committee</li> <li>▪ <b>Santa Clara River Watershed Committee</b> – Agency representative to this stakeholder group</li> </ul>
<p><b>UNITED WATER CONSERVATION DISTRICT, SANTA PAULA, CA</b></p> <p><i>Groundwater Department Manager</i></p> <p>2009-2014</p>	<p>Groundwater Department Manager overseeing eight professional and technical staff responsible for maintaining groundwater supply and quality in all, or parts of, eight groundwater basins in Ventura County. Key departmental activities included, but were not limited to, preparation of groundwater management plans, collecting and analyzing water level and water quality data from 400 wells in the District, development of basin conceptual models from borehole and surface geophysical data, preparation of a regional groundwater flow model, technical support for AB3030 Groundwater Management Council and other water management entities, performing surface geophysical surveys to characterize aquifer geometry, monitoring hydrogeologic impacts of the District's aquifer recharge program, and monitoring of sea water intrusion in coastal areas. Litigation support team member.</p>

<p><b>LAYNE GEOSCIENCES &amp; COLOG GROUPS</b></p> <p><b>LAYNE CHRISTENSEN COMPANY</b></p> <p><b>FONTANA, CA</b></p> <p><i>Manager-Western Region</i></p> <p><i>1997-2009</i></p>	<p>Manager for groundwater exploration, water supply development projects, aquifer storage and recovery facility siting programs, well design, and downhole geophysical logging programs for the western U.S. (CA, AZ, NV, UT, OR, WA, ID). Provided hydrogeological evaluations in support of potable water and irrigation well siting projects. Evaluated water chemistry data with respect to drinking water standards. Conducted contract negotiations with water districts, private developers, regional water purveyors and others for technical services. Expanded technical services to include surface and borehole geophysics: Optical TeleViewer System (OPTV), HydroPhysics, CSAMT, and GIS. Oversaw technical and administrative operations for Western Region operations of two groups of Layne Christensen Company: Layne GeoSciences and COLOG. Directed Research and Development activities associated with well hydraulic performance assessments and use of borehole geophysical techniques to evaluate well rehabilitation efforts. Administrative responsibilities include business development activities (e.g., presentations to potential clients, proposal preparation, contract administration, development of business promotion brochures), personnel development in Western Region, and financial planning and forecasting.</p>
<p><b>CALIFORNIA STATE UNIVERSITY - SAN BERNARDINO</b></p> <p><i>Instructor- Hydrogeology</i></p> <p><i>Dept. of Geological Sciences</i></p> <p><i>2000-2001</i></p>	<p>Taught hydrogeology courses to upper-level undergraduate and graduate students: GEOL375 <i>Introduction to Hydrogeology</i> and GEOL376 <i>Field Methods in Hydrogeology</i>. Developed course curricula and recommended library acquisitions to expand hydrogeology references.</p>
<p><b>QUATERNARY INVESTIGATIONS, INC. COLTON, CA</b></p> <p><i>Principal/President</i></p> <p><i>1991-1997</i></p>	<p>Corporate principal and manager of Colton facility. Administrative, technical, and marketing duties for environmental projects such as site characterizations (e.g., hydrocarbons, pesticides, chlorinated solvents, lead, mercury), developing Remedial Action Plans/Corrective Action Plans for in situ and ex situ treatments, and design, installation, as well as operation and maintenance of soil and groundwater remediation programs. Prepared bid specifications for subcontractors.</p>
<p><b>ICG HYDROTECH, INC.</b></p> <p><b>REDLANDS, CA</b></p> <p><i>Office Manager</i> <i>Associate Geologist</i></p> <p><i>1989-1991</i></p>	<p>Administrative, technical, and marketing responsibility for staff of environmental professionals performing environmental investigations and site remediation in Southern California. Functioned as Regional Safety Officer (RSO) for Redlands office.</p>

<p><b>ECOLOGY &amp; ENVIRONMENT, INC.</b></p> <p><b>LOS ANGELES, CA</b></p> <p><i>Manager-Geological Sciences Group</i></p> <p><i>Chief Hydrogeologist</i></p> <p>1988-1989</p>	<p>Administrative and technical responsibility for geologists, hydrogeologists, and environmental technicians performing environmental site investigations and remediation programs.</p>
<p><b>TETRA TECH, INC.</b></p> <p><b>PASADENA, CA</b></p> <p><i>Senior Hydrogeologist</i></p> <p>1987-1988</p>	<p>Responsible for project management and supervision of junior geologists/hydrogeologists performing environmental site investigations and soil and groundwater remediation.</p>
<p><b>TETRA TECH, INC.</b></p> <p><b>SAN BERNARDINO, CA</b></p> <p><i>Staff Geologist</i></p> <p>1985-1987</p>	<p>Staff Geologist preparing Geologic Resources and Soil Resources sections of environmental impact statements for U.S. Air Force Inter-Continental Ballistic Missile (ICBM) facility expansion programs in 12 states. Assisted Cultural Resource department by providing geologic/geomorphic input to archaeological site excavations to determine context of cultural artifacts. Internal technical reviewer of Water Resources sections of EIS documents.</p>
<p><b>URS-BERGER</b></p> <p><b>SAN BERNARDINO, CA</b></p> <p><i>Staff Geologist</i></p> <p>1983-1985</p>	<p>Staff Geologist preparing <i>Geologic Resources</i> and <i>Soil Resources</i> sections of environmental impact statements for U.S. Air Force Inter-Continental Ballistic Missile (ICBM) facility expansion programs in 12 states. Assisted <i>Cultural Resource</i> specialists with predictive modeling efforts to estimate the number of potential cultural resource sites in project areas. Provided geologic/geomorphic input to archaeological site excavations to determine context of cultural artifacts. Internal technical reviewer of <i>Water Resources</i> sections of EIS documents.</p>

<b>EARTH TECHNOLOGY CORPORATION</b>  <b>LONG BEACH, CA</b>  <i>Staff Geologist</i>  1981-1983	Staff Geologist assigned to critical facility siting programs: high-level radioactive waste (HLRW) repositories and InterContinental Ballistic Missile (ICBM) launch sites. Performed stratigraphic, sedimentologic, and geomorphic evaluations of Gulf Coast salt domes to determine rate of salt diapirism and suitability of these structures for HLRW disposal. Coauthored a "white paper" for Dept. of Energy on criteria to rank crystalline bedrock with respect to suitability for HLRW disposal. Evaluated geologic conditions and water resource availability to support the construction of ICBM launch sites in remote valleys of Utah and Nevada.
<b>GEOSCIENCE RESEARCH ASSOCIATES, INC.</b> <b>BLOOMINGTON, IN</b>  <i>Assistant Geologist</i>  1979-1981	Part-time position as Assistant Geologist responsible for coding drillers' logs for input to statewide database for use by Indiana Geological Survey.
<b>Noranda Exploration, Inc.</b> <b>Lebanon, TN</b>  <i>Assistant Geologist</i>  1979 summer	Developed regional conceptual model for distribution of Mississippi Valley-type lead-zinc deposits by examining drill cuttings archived by state geological surveys of Ohio and New York.

## PROFESSIONAL AFFILIATIONS

- American Ground Water Trust  
Board of Directors, 2008-present
- National Ground Water Association  
Member, 1985-present  
NGWA/ANSI Water Well Construction Standard Development Committee  
Well Siting and Sampling Task Group  
Screens and Intakes Task Group
- Groundwater Resource Association of California  
Member, 2001-present  
Central Coast Branch – President, 2011- 2017
- Association of California Water Agencies  
Groundwater Committee, 2010-present
- Watersheds Coalition of Ventura County  
Steering Committee, 2014-2018
- Santa Clara River Watershed Committee



## TEACHING EXPERIENCE

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United Water Conservation District representative, 2015-2017

- California State University-San Bernardino, Dept of Geological Sciences  
Professional Advisory Board, 2010- present
- 

### CALIFORNIA STATE UNIVERSITY-SAN BERNARDINO, DEPT. OF GEOLOGICAL SCIENCES

- GEOL375 Introduction to Hydrogeology Lecture (majors) and Laboratory sessions
- GEOL376 Field Methods in Hydrogeology Lecture (majors) and Laboratory sessions

### INDIANA UNIVERSITY-PURDUE UNIVERSITY AT INDIANAPOLIS, DEPT. OF GEOLOGY

- GEOL110 Physical Geology Lecture and Laboratory for Geology majors and non-majors
- GEOL130 Physical Geology Laboratory - Laboratory course in Physical Geology for Geology majors
- GEOL107 Man and His Geologic Environment - Introductory environmental geology lecture course designed for non-majors
- GEOL109 Historical Geology Laboratory - Laboratory course in Historical Geology for Geology majors and non-majors
- GEOL430 Geomorphology Laboratory - Laboratory course in principals of geomorphology for upper-level geology majors

### CALIFORNIA STATE UNIVERSITY-FULLERTON, DEPT. OF GEOLOGICAL SCIENCES

- Use of Borehole Geophysics for Water Well Design, 2002, Seminar for Well Hydraulics and Development Course
-

## PROFESSIONAL PUBLICATIONS AND PRESENTATIONS

- Douglas Tolley, PhD, Gregory Buczek, and **Tony Morgan**, 2022, *Reducing SGMA Implementation Costs for Disadvantaged Groundwater Basins by Automating Workflows*, Western Groundwater Congress, Groundwater Resources Association of California, September 2022.
- Morgan, Tony**, 2021. *Sometimes it Rains... Sometimes it Doesn't... Future Hydrology Scenarios in the Fillmore and Piru Basins* at Association of Water Agencies of Ventura County, Sept 2021 (presentation).
- Morgan, Tony**, 2020. *The Sustainable Groundwater Management Act (SGMA) - What are the Prospects for Managing Irrigation Pumping to Achieve Long-Term Sustainability of California's Groundwater?* at The American Ground Water Trust, Managing Florida's Aquifers: Annual Conference, Oct 2020 (presentation).
- Schwartz, Kaelyn, Douglas Tolley, **Morgan, Tony**, 2020. *Subsidence & SGMA - Characterizing the Ups and Downs Outside of the Central Valley* at The Third Annual Western Groundwater Congress, Groundwater Resource Association of California, Sept 2020 (presentation).
- Morgan, Tony**, 2020. *So the Climate is Changing...Now What?* at The Third Annual Western Groundwater Congress, Groundwater Resource Association of California, Sept 2020 (presentation).
- Morgan, Tony**, 2020. *The Sustainable Groundwater Management Act (SGMA) - What are the Prospects for Managing Irrigation Pumping to Achieve Long-Term Sustainability of California's Groundwater?* at The American Ground Water Trust, Texas Groundwater Webinar, Aug 2020 (presentation).
- Morgan, Tony**, 2020, *OMG...The Climate is Changing* at National Groundwater Association: Water, Energy, and Policy in a Changing Climate, February 2020 (presentation).
- Morgan, Tony**, 2019, *Land Use and SGMA* at The Second Annual Groundwater Sustainability Agency Summit, Groundwater Resource Association of California, June 2019 (invited panelist).
- Morgan, Tony**, 2018, *The Unknown Unknowns: Things You Learn Preparing a GSP* at The First Annual Western Groundwater Congress, Groundwater Resource Association of California, Sept 2018 (presentation).
- Morgan, Tony**, 2018. *Adaptive Management – Operating Under Unknowns* at The First Annual Groundwater Sustainability Agency Summit, Groundwater Resource Association of California, June 2018 (invited panelist).
- Morgan, Tony**, 2018, *Stormwater and Ground Water Conjunctive Use in the Santa Clara River Valley* at Everything Aquifers and Groundwater Management, Association of Ground Water Agencies and American Ground Water Trust, Feb 2018 (presentation).
- Morgan, Tony**, 2017, *What's in the tank* at *Countdown to Sustainability: A Forum on Ventura County's Progress Toward SGMA Implementation* sponsored by Farm Bureau of Ventura County, Ventura County Watershed Protection District and Watershed Coalition of Ventura County, Nov 2017 (presentation).
- Moore, Tim, Dan Detmer, **Tony Morgan**, John Lindquist, 2017, *Santa Paula-Mound-Forebay Basin Boundary TDEM Geophysical Survey in Ventura County, California*, Groundwater Resource Association of California, October 2017 (poster).
- Kuepper, Kathleen, Dan Detmer, John Lindquist, **Tony Morgan**, 2017, *Groundwater Monitoring Protocols for Seawater Intrusion – Example of Challenges and Experiences in a Coastal Groundwater Basin*, Groundwater Resource Association of California, October 2017 (presentation).
- Lindquist, John, Jason Sun, **Tony Morgan**, Dan Detmer, 2017, *Minimum Thresholds, MODFLOW, and Sustainable Yield – Example of Model Application in a Coastal Groundwater Basin*, Groundwater Resource Association of California, May 2017 (presentation).
- Morgan, Tony**, 2017, *SGMA Implementation Flexibility and Adaptability – Examples from Ventura County*, California Irrigation Institute 55<sup>th</sup> Annual Conference – Managing our Water Checkbook: Solutions for a Balanced Bottom Line, Jan 2017 (presentation).
- Morgan, Tony**, 2017, *GSP-Lite: Using a Groundwater Flow Model to Approximate Sustainable Yields for Oxnard Plain and Pleasant Valley Groundwater Basins*, Coast Geological Society, Jan 2017 (presentation).
- Morgan, Tony**, 2016, *Groundwater Manager's Perspective, Drought Response Workshop*, CA Department of Water Resources, Southern California Water Committee, and National Water Research Institute, May 2016 (panel presentation).
- Miller, Richard, William Black, Martin Miele, **Tony Morgan**, Julian Ivanov, Shelby Peterie, and Yao Wong 2016, *High- Resolution Seismic Reflection to Improve Accuracy of Hydrogeologic Models in Ventura County, CA, USA*, The Leading Edge, V. 35, Issue 9, pg. 776-785.
- Morgan, Tony**, 2016, *A Historic Drought and Groundwater Management Legislation: Can We Regulate our Way to Sustainability*, Coast Geological Society, March 2016 (presentation).
- Morgan, Tony**, 2016, *SGMA Compliance: Full Speed Ahead...Sort Of - Lessons from Ventura County*, Overview of Current Groundwater Management Efforts in Ventura County, Association of Ground Water Agencies and American Ground Water Trust, Feb 2016 (presentation).
- Morgan, Tony**, 2016, *Sustainable Groundwater Management Act Workshop*, Fillmore-Piru Basins Groundwater Pumpers Associations, January 2016 (presentation).
- Melissa Rohde, Sally Liu, Kirk Klausmeyer, Jeanette Howard, Bryan Bondy, and **Morgan, Tony**, 2016, *A Guidance Framework for Considering Groundwater Dependent Ecosystems under SGMA: A Case-Study from Ventura County*, Developing Groundwater

- Sustainability Plans for Success, Groundwater Resource Association of California, June 2016 (poster presentation).
- Jason Sun, Dan Detmer, Tim Moore, John Lindquist, and **Morgan, Tony**, 2016, *Development of a Numerical Model for Sustainable Groundwater Management in Ventura County, California*, Groundwater Models and Data, Groundwater Resource Association of California, February 2016 (poster presentation).
- Morgan, Tony**, 2016, *Where Will We Find the Water*, Water Market Solutions for California Water Issues, American Ground Water Trust, April 2016 (presentation).
- Morgan, Tony**, 2014, Surface and Borehole Geophysics as Tools for Groundwater Resource Management – Recent Experiences from Ventura County, Inland Geological Society, Mar 2014 (presentation).
- Morgan, Tony**, 2013, 80+ Years of Aquifer Replenishment in Ventura County, Association of California Water Agencies, Regulatory Summit, August 2013 (presentation).
- Morgan, Tony**, 2013, Dynamic Well Profiling – Optimizing Well Performance in High Resolution Tools and Techniques for Optimizing Groundwater Extraction for Water Supply, Groundwater Resources Association of California, June 2013 (presentation).
- Morgan, Tony**, 2013, E-Logs, Driller's Logs, and GeoWizardary: Recent Developments in the Hydrostratigraphy of the Oxnard Plain, Pleasant Valley and Forebay Groundwater Subbasins, Ventura County, CA, Coast Geological Society, April 2013 (presentation).
- Morgan, Tony**, 2012, *Fold, Faults, and Aquifers – Important Components of the Ventura Regional Groundwater Flow Model*, CSU – San Bernardino, Geological Sciences Departmental Seminar Series, Nov 2012 (presentation).
- Morgan, Tony**, 2012, *Fold, Faults, and Aquifers – Important Components of the Ventura Regional Groundwater Flow Model*, AWA-CCWUC, Ventura, CA, Oct 2012 (presentation).
- Tim Moore, Dan Detmer, **Morgan, Tony**, and Pete Dal Pozzo, 2012, *Pressure Transducer and Data Logger Use and Applications as Part of Water Level Elevation Monitoring Network*, Groundwater Resources Association of California, 21<sup>st</sup> Annual Conference and Meeting, October 2012 (poster).
- Pete Dal Pozzo, **Morgan, Tony**, and Tim Moore, 2012, Hydrogeologic Evaluation of the Apparent Camarillo-Hueneme Groundwater Flow Barrier, Oxnard Plain, Ventura County, California, Groundwater Resources Association of California, 21<sup>st</sup> Annual Conference and Meeting, October 2012 (poster).
- Morgan, Tony**, 2012, *Saline Water Intrusion on the South Oxnard Plain: 2011 Update*, State of the Santa Clara River Water Symposium, May 2012 (poster).
- Morgan, Tony**, 2012, *Groundwater Conditions in the Santa Clara Valley and Oxnard Plain*, AWA Waterwise Water Information Breakfast Series, Oxnard, CA, Jan 2012 (presentation).
- Morgan, Tony** and Tim Moore, 2011, Refining a Regional-Scale Groundwater-Flow Model to Address Basin-Specific Management Goals in Ventura County, Inland Geological Society, Riverside, CA, Dec 2011 (presentation).
- Morgan, Tony**, 2011, Saline Water Intrusion on the South Oxnard Plain: What We Know and What We Don't Know, AWA- CCWUC, Ventura, CA, Oct 2011 (presentation).
- Morgan, Tony**, Bryan Bondy, Pete Dal Pozzo, Martin Miele, and Dan Detmer, 2011, *Refining a Regional-Scale Groundwater-Flow Model to Address Basin-Specific Management Goals in Ventura County*, Groundwater Resources Association of California, 28<sup>th</sup> Biennial Groundwater Conference, October 2011 (presentation).
- Miller, Richard, William Black, Martin Miele, **Tony Morgan**, Julian Ivanov, Jianghai Xia, and Shelby Peterie, 2011, Feasibility of High Resolution Seismic Reflection to Improve Accuracy of Hydrogeologic Models in a Culturally Noisy Part of Ventura County, CA, USA, Society of Exploration Geophysics Expanded Abstracts 30, 3722 (2011), 81<sup>st</sup> Annual Meeting, San Antonio, TX.
- Morgan, Tony**, 2011, *Groundwater Conditions and Challenges in the Santa Clara Valley and Oxnard Plain*, AWA Waterwise Water Information Breakfast Series, Oxnard, CA, Jan 2011 (presentation).
- Miele, Martin and **Tony Morgan**, 2010, *High Resolution Seismic Reflection Survey of the Oxnard Plain Basin*, Coast Geological Society – Groundwater Resources Association of CA Central Coast Branch Joint Meeting (presentation).
- Morgan, Tony**, 2010, *Production Well Design Considerations*, AWA-CCWUC, Ventura, CA, Mar 2010 (presentation).
- Morgan, Tony** and Leigh Wood Dudash, 2010, *Geophysics as a Component of a Groundwater Basin Conceptual Model*, Groundwater Resources Association, Geophysics at the Beach Symposium, Santa Ana, CA, May 2010 (poster).
- Morgan, Tony**, 2010, *Production Well Design Considerations*, Channel Islands Water Utilities Association, Ventura, CA. (presentation).
- Dudash, Leigh Wood, **Tony Morgan**, and Jason Kennedy, 2009, *Integrated Geophysical Investigation of Pauma Groundwater Basin, California*, Symposium on the Application of Geophysics to Engineering and Environmental Problems 2009: pp. 261-271. (poster).
- Morgan, Tony**, 2009, *Well Hydraulic Performance Assessment*, Channel Islands Water Utilities Association, Operator Technology Workshop, Ventura, CA, (presentation).
- Morgan, Tony**, 2009, *Regulatory Framework – United Water Conservation District*, American Groundwater Trust, Teachers Institute, Oxnard, CA, Nov 2009 (presentation).

- Morgan, Tony**, 2009, *Water Quality Challenges – United Water Conservation District*, American Groundwater Trust, Teachers Institute, Oxnard, CA, Nov 2009 (presentation).
- Morgan, Tony**, 2009, 82 Years of Aquifer Storage in Ventura County, California: Economics, Technologies, Regulations and Long-Term Future Challenges ,American Groundwater Trust, ASR IV Conference, Orlando, FL, Sept 2009 (presentation).
- Morgan, Tony**, 2009, *Global Warming and the Impacts of Declining Water Levels on Production Wells*, Groundwater Resources Association of California, 27<sup>th</sup> Biennial Groundwater Conference, October 2009 (presentation).
- Morgan, Tony**, 2009, *Water Well Hydraulic Performance Assessment and Water Well Re-Engineering*, Florida Rural Water Association - training program offered at 5 locations in Florida, sponsored by FRWA, January 2009 (presentations).
- Morgan, Tony**, 2008, *The Use of Neutron and Compensated Density Technologies to Monitor Water Recharge at ASR Facilities: Examples from Southern California*, ASR VIII Conference sponsored by American Ground Water Trust, September 2008-Orlando, FL (presentation).
- Morgan, Tony**, 2008, *Decision-Making and Data Needs Related to Well Performance and Rehabilitation*, sponsored by American Ground Water Trust, September 2008-Langley, BC (presentation),
- Morgan, Tony** and Leigh Wood-Dudash, 2008, *Applications of Geophysics for Water Supply Well Siting Programs*, Rocky Mountain WEA and Rocky Mountain American Water Works Association, Annual Conference, September 2008-Colorado Springs, CO (abstract, presentation).
- Morgan, Tony**, 2008, *Water Well Hydraulic Performance Evaluation: Implications for Energy Efficiency at Energy Savings with Proper Well Field Management Seminar*, sponsored by The Gas Company, May 2008-Downey, CA (presentation).
- Morgan, Tony**, 2008, *Well Field Optimization: An Overview of Energy Savings and Operational Efficiencies at Energy Savings with Proper Well Field Management Seminar*, sponsored by The Gas Company, May 2008-Downey, CA (presentation).
- Morgan, Tony**, 2008, *Global Warming and the Impacts of Declining Water Levels on Production Wells*, American Water Works Association, CA-NV Section, April 2008-Hollywood, CA (abstract, presentation).
- Morgan, Tony**, 2008, *Geophysical Exploration for Well Siting Programs*, American Water Works Association, CA-NV Section, April 2008-Hollywood, CA (abstract, presentation).
- Morgan, Tony**, 2007, *Water Well Drilling Techniques: 101 Ways to Make a Hole in the Ground*, American Water Works Association, CA-NV Section, October 2007-Sacramento, CA (abstract, presentation).
- Morgan, Tony**, 2007, *Panel on Collaborative Problem Solving: Land Use, Economy, and Environment*, San Bernardino County Water Conference, 9 August 07, Ontario, CA (panel member).
- Morgan, Tony**, 2007, *Water Resources for the Building Industry*, Building Industry Association Annual Show, November 2007-Long Beach, CA (panel member).
- Morgan, Tony**, 2007, *The Use of Neutron and Compensated Density Technologies to Monitor Water Recharge at ASR Facilities: An Example from Southern California*, Arizona Hydrological Society/Southwest Hydrology Regional Water Symposium, August 2007-Tucson, AZ (abstract, presentation).
- Morgan, Tony**, 2007, *Water Well Rehabilitation Techniques: the Good, the Bad, and the Ugly*, American Water Works Association, CA-NV Section, May 2007-Las Vegas, NV (abstract, presentation).
- Morgan, Tony**, Glenn d'Eon, Eric Vincent, 2006, *Well Construction Guidelines at Well Construction, Maintenance, and Repair/Update on Arsenic Treatment Technologies*, Nevada Rural Water Association Training Session, Laughlin, NV (presentation).
- Morgan, Tony**, 2006, *Water Well Design 101- General Design Considerations for High Capacity Water Wells*, Nevada Rural Water Association Annual Meeting, Primm, NV (presentation).
- Morgan, Tony**, 2005, *Well Design for Optimal Performance* at Municipal Water Seminar sponsored by The Gas Company Energy Resource Center (presentation).
- Morgan, Tony**, 2005, *Water Well Construction Seminar*, Nevada Rural Water Association /Moapa Valley Water District, NV (presentation).
- Morgan, Tony**, 2005, *Water Well Performance Characterization*, ASCE-Tucson, AZ Chapter (presentation).
- Morgan, Tony** and Derik Howard, 2004, *Application of Surface Geophysical Exploration Techniques for Siting Water Wells: An Overview of Technologies*, American Water Works Association, CA-NV Section, October 2004- Sacramento (abstract, presentation).
- Morgan, Tony** and Joseph Abreau, 2003, *Water Well Performance Characterization Using Downhole Technologies: Considerations for Baseline Evaluations*, American Water Works Association, CA-NV Section, June 2003-San Diego (abstract, presentation).
- Hasbrouck, James and **Tony Morgan**, 2003, *Deep Groundwater Exploration Using Geophysics*, Southwest Hydrology, July/Aug 2003, Vol. 2, Number 4 (publication)
- Hasbrouck, James, **Tony Morgan**, Leslie Boockoff, and Louis Kohn, 2003, *Deep Groundwater Exploration Using Controlled Source Audio Magnetotellurics / Magnetotellurics (CSAMT/MT)*, NGWA Southwest FOCUS Conference: Water Supply and Emerging Contaminants, February 2003 (abstract, presentation, publication)



- Morgan, Tony**, Leslie Boockoff, and Tom Staatz, 2002, *Use of Borehole Imaging Technologies to Characterize Bedrock for Hydrogeological and Engineering Applications*, Association of Engineering Geologists, Annual Meeting, September 2002 (abstract and presentation).
- Miele, Martin J., **Tony Morgan**, and Greg Bauer, 2001, *Lateral and Vertical Delineation of Water Producing Fractures and Zone-Specific Water Quality Data with CSAMT/MT and HydroPhysical Logging*, Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP), March 2001 (presentation and publication).
- Morgan, Tony**, 1994, *Multiple Late Holocene Paleogeomorphic Surfaces in Coastal Sand Dunes, Vandenberg AFB, Santa Barbara County, California*, American Quaternary Association, 13<sup>th</sup> Biennial Meeting, Program and Abstracts.
- Morgan, Tony**, 1994, *Late Pleistocene and Holocene Paleoclimatic Reconstructions in the Lower Santa Ynez River Valley, Santa Barbara County, California*, American Quaternary Association, 13<sup>th</sup> Biennial Meeting, Program and Abstracts.
- Morgan, Tony** and Linda Scott Cummings, 1990, *Late Pleistocene and Holocene Paleoenvironmental Conditions in the Lower Santa Ynez River Basin*, Proceedings of Society for California Archaeology, pp. 243:260.
- Morgan, Tony** and Linda Scott Cummings, 1989, *Holocene Paleoenvironmental Conditions in the Lower Santa Ynez River Basin*, Society for California Archaeology, 230 Annual Meeting, (abstract and presentation).
- Peter, Kevin J., James Rudolph, **Tony Morgan**, Jean Hudson, and Craig F. Woodman, 1988, *Archaeological Test Investigation and Evaluation of Sbr-1576, San Bernardino County, California*, prepared by URS Corporation. (report)
- Morgan, Tony**, 1986, *Geomorphological Investigations at CA-VEN-110, Ventura County, California* in Archaeological Study of CA-VEN-110, Ventura, California by Roberta Greenwood, John Foster, and Gwendolyn Romani. (report).
- Morgan, Tony**, 1986, *Quaternary Geomorphic Surfaces in Southeast Wyoming: An Example from Horse Creek, Laramie County, Wyoming*, American Quaternary Association, Ninth Biennial Meeting, Program and Abstracts.
- Morgan, Tony**, 1986, *Evidence for Pleistocene Periglacial Environments East of the Laramie Mountains, Southeast Wyoming*, American Quaternary Association, Ninth Biennial Meeting, Program and Abstracts.
- Morgan, Tony** and R.D. Hall, 1982, *Pediments in the North Boulder River Basin, Southwestern Montana*, American Quaternary Association, Seventh Biennial Meeting, Program and Abstracts.
- Morgan, William T.** and Robert D. Hall, 1979, *Stratigraphy and Sedimentation of the Christensen Bog, Hancock County, Indiana*, Geological Society of America, North-Central Section Meeting (abstract and presentation)
- Morgan, Tony**, 1979, Drainage-Related Soil Profile Development in a Wisconsin Till of the Christensen Mastodon Site, Student Honors Symposium-Honors Day Convocation April 20, 1979.

**California Schedule of Fees**  
*(Effective January 1, 2024 through December 31, 2024)*  
**Confidential**

**Professional Services**

Principal Professional III.....	\$335.00/hour
Principal Professional II.....	\$317.00/hour
Principal Professional I.....	\$280.00/hour
Senior Professional III.....	\$265.00/hour
Senior Professional II.....	\$254.00/hour
Senior Professional I.....	\$234.00/hour
Project Professional III.....	\$216.00/hour
Project Professional II.....	\$199.00/hour
Project Professional I.....	\$184.00/hour
Staff Professional III.....	\$168.00/hour
Staff Professional II.....	\$155.00/hour
Staff Professional I.....	\$139.00/hour
Laboratory Manager.....	\$182.00/hour
Principal Technician.....	\$190.00/hour
Managing Technician.....	\$165.00/hour
Technician IV.....	\$150.00/hour
Technician III.....	\$130.00/hour
Technician II.....	\$120.00/hour
Technician I.....	\$108.00/hour
GIS Specialist.....	\$175.00/hour
CADD Designer.....	\$155.00/hour
CADD/GIS/Database Manager II.....	\$140.00/hour
CADD/GIS/Database Manager I.....	\$130.00/hour
Senior Technical Editor.....	\$152.00/hour
Technical Editor.....	\$130.00/hour
Biologist II.....	\$130.00/hour
Biologist I.....	\$115.00/hour
Project Assistant III.....	\$130.00/hour
Project Assistant II.....	\$120.00/hour
Project Assistant I.....	\$105.00/hour

**Expenses**

Travel	
Airfare, car rental, cab, bus, parking.....	Actual cost
Lodging, meals, phone.....	Actual cost or negotiated per diem rates
Mileage	
Personal vehicle.....	Prevailing IRS rates
Company vehicle	
Daily rate.....	\$110/day + actual gas cost
Half day rate.....	\$55/half day + actual gas cost
Mileage.....	Prevailing IRS rates
Subcontractors/temporary service personnel.....	Actual cost plus 10%
Computers, specialized software, and communications.....	Special services at additional charge
Equipment	
Rentals (e.g., environmental monitors).....	Actual cost plus 10%
Fabrication in our shop.....	Labor plus materials
Misc. field equipment and supplies.....	Actual cost plus 10%
Meters, gauges, and monitors.....	Separate schedule available upon request

**TERMS**

*Payment terms for professional services and expenses are net 30 days. Unpaid balance will be assessed a service fee of 1.5% per month.*

**NOTES**

1. All fees are subject to local/state sales or gross receipts tax, as applicable.
2. Delivery of depositions or expert testimony will be billed at 1.5 times Fee Schedule rates.
3. Work requiring Health & Safety Level C or Level B protection will be billed as a surcharge, \$25 or \$50 per hour, respectively, to the Fee Schedule rates.
4. A service fee of 3% will be charged for credit card payments.
5. Hourly rates and expenses will be adjusted annually.



## **CURRICULUM VITAE**

July 2023

### **Robert H. Abrams, PhD, PG, CHg**

*Principal Hydrogeologist*

mobile: +1.650.743.0594

email: [bob.abrams@aquilologic.com](mailto:bob.abrams@aquilologic.com)



#### **Disciplines**

Hydrogeology, Water Resources, Geology, Geostatistics, Analytical and Numerical Modeling, Water Quality, Groundwater and Vadose Zone Fluid Flow, Contaminant Fate and Transport.

#### **Education**

Ph.D. Hydrogeology, Stanford University, 1999

M.S. Hydrogeology, Stanford University, 1996

B.S. Geology, San Francisco University, 1991

#### **Professional Registrations**

Professional Geologist, CA (No. 8703)

Certified Hydrogeologist, CA (No. 931)

Licensed Geologist, North Carolina (No. 2639)

#### **Professional Experience**

Bob has over 25 years of professional experience in groundwater resource development, groundwater sustainability, groundwater banking, groundwater quality, and model design and evaluation. He has worked for the California Geological Survey, the U.S. Geological Survey, Stanford University, San Francisco State University, consulting firms, and as an independent consultant for public and private clients. Recent projects have included vadose zone characterization and modeling, evaluation of subsidence investigations, developing and reviewing integrated groundwater/surface water hydrologic models that include simulation of current and future land-use-based water demand and the impact of climate change, and preparation of Groundwater Sustainability Plans.

#### **Project Experience**

##### **Summary of Selected Recent Projects**

- Currently assisting a large group of Salinas Valley growers on hydrogeological concerns related to Groundwater Sustainability Plans pursuant to the Sustainable Groundwater Management

Act. Concerns include reductions in groundwater inflows to downgradient subbasins due to extractions in upgradient subbasins – *Salinas Basin Water Alliance/Brownstein Hyatt Farber Schreck*

- Currently serving on the Groundwater Technical Advisory Committee (GTAC) for the Salinas Valley Basin. The purpose of this TAC is to provide advice and guidance on a range of ongoing groundwater issues and projects, including model development and other hydrogeological projects. Previously served on the predecessor Seawater Intrusion Working Group (SWIG) and SWIG TAC. These groups were tasked with evaluating and recommending approaches for mitigating seawater intrusion in the 180/400-Foot Aquifer Subbasin – *Salinas Basin Groundwater Sustainability Agency, Carmel Valley, California, representing the Salinas Basin Water Alliance.*
- Currently serving on a Drought Technical Advisory Committee (TAC) charged with developing standards and guiding principles for determining release schedules and operations of Nacimiento and San Antonio reservoirs during multiyear droughts. The TAC is also charged with developing the release schedules during such droughts – *Monterey County Water Resources Agency, Salinas, California, representing Grower-Shipper Association of Central California.*
- Designed and wrote custom computer programs to construct and test a facsimile of the USGS Central Valley Hydrologic Model (CVHM) that runs in Groundwater Vistas (GV), a graphical user interface. The computer programs generated input data for the facsimile model from CVHM MODFLOW packages that are not supported by GV. The facsimile model produces results that are nearly identical to CVHM – *Confidential Client.*
- Combined vadose-zone flow and transport modeling, groundwater flow modeling, and particle-tracking simulations to estimate the persistence of dissolved 1,2,3-trichloropropane in the subsurface. Multiple application areas were characterized using lithologic logs and water flux out of the root zone taken from C2VSimFG Beta. Custom computer programs were written to determine arrival time at a declining water table. MODFLOW and MODPATH were used to estimate travel time from the water table to receptor water-supply wells. Four regions in California (one in Central Valley, three in Southern California) were successfully analyzed with this methodology (settlements and jury awards). For the Central Valley region, the CVHM facsimile model (described above) was used – *Confidential Clients.*
- Co-wrote the Chapter Groundwater Sustainability Plan for the Westside Water Authority in Kern County. Extremely sparse data and modeling results from C2VSimFG-Kern were used to estimate current and future water budgets and groundwater availability – *Westside Water Authority.*
- Conducted environmental impact assessment simulations using the CVHM facsimile model described above to evaluate drawdown and subsidence caused by a proposed brackish groundwater water treatment project in Kern County – *Westside Water Authority.*

- Critically evaluated subsidence estimates along the Tule Subbasin portion of the Friant-Kern Canal (FKC) by reviewing historical USGS reports, InSAR data, geomechanical modeling, and the Tule Subbasin Groundwater Flow Model. This evaluation indicated that responsibility for FKC subsidence should be shared across the subbasin and not focused primarily on the Eastern Tule Groundwater Sustainability Agency – *Confidential Client*.
- Critically evaluated groundwater flow and solute transport models for three coal ash disposal sites in North Carolina. Primary questions included if the models simulated flow and transport properly and sufficiently to allow the sites' owner to claim no offsite groundwater quality impacts above water quality standards – *Southern Environmental Law Center*.
- Developed a new IWFM groundwater-surface water model, based on the Central-Valley-wide C2VSim model, for Stanislaus County to assess impacts in terms of foreseeable land-use changes and installation of new wells – *Stanislaus County, Regional Groundwater-Surface Water Model for PEIR, Modesto, California*.
- Assisted Stanislaus County with evaluation of new major well permit applications based on a then-recently passed groundwater ordinance requiring evaluation under CEQA for potential pumping-induced impacts to the groundwater basin, such as lowered water levels in existing wells, land subsidence, and significant groundwater or surface water depletion – *Stanislaus County, Well Permit CEQA Analysis, Modesto, California*.
- Invited to participate in the Deep Aquifer Roundtable, a formal meeting attended by Salinas Valley hydrogeology experts to discuss approaches to monitoring and protecting the deepest portions of the Salinas Valley aquifer system – *Monterey County Water Resources Agency, Salinas, California*.
- Served on the Technical Advisory Committee for the development of the Salinas Valley Integrated Hydrologic Model, a new MODFLOW model constructed by Monterey County and the U.S. Geological Survey – *Monterey County Water Resources Agency, Salinas, California representing Grower-Shipper Association of Central California*.
- Well efficiency test results for multiple years and multiple wells were evaluated for a Salinas Valley grower and food processor. Quantitative and statistical analyses were used to assess well performance and make recommendations for potential well maintenance and repair activities – *Nunes Vegetables, Salinas, California*.
- The factors influencing nitrate concentrations in well-water from approximately 60 wells on 40 ranches were determined and an enhanced groundwater monitoring program was developed. Diverse and complex data sets were analyzed statistically and qualitatively to understand the geologic, hydrologic, and anthropogenic factors that variably influence well-water concentrations over short- and long-term timeframes. Specific recommendations for wellhead protection were also developed – *Costa Farms, Analysis of Observed Nitrate Concentration Trends in Irrigation Wells, Soledad, California*.
- Published reports and data from international and national seawater intrusion mitigation efforts were reviewed and analyzed. The analysis was to assess the feasibility, level of effort

required, volumes of water necessary, and costs of implementation in the Salinas Valley of a seawater intrusion injection barrier using recycled water. Ongoing injection barrier projects in Orange County and L.A. County were selected for in-depth review to evaluate the feasibility of a similar project in Monterey County – *Tanimura & Antle, Salinas, California*.

- Publicly available groundwater quality data from a set of regularly sampled water-supply wells were evaluated statistically to develop an alternative to installation of new monitoring wells for a land application area that received wastewater from a food processing plant. The effort was driven by a Central Coast Regional Water Quality Control Board order requiring client to participate in the General Waste Discharge Requirements (WDRs) for Fruit and Vegetable Processors, which has stricter monitoring requirements than the previous individual WDRs – *Dole Fresh Vegetables, Salinas, California*.
- Evaluated (with SEAWAT) the degree to which irrigation wells were drawing seawater inland and if groundwater withdrawals contributed to anoxic conditions in certain reaches of a river hydraulically connected to the aquifer – *El Sur Ranch, Seawater Intrusion and Impact of Irrigation Wells, Monterey County, California*.
- Monte Carlo hydraulic gradient analysis and stochastic 1D and 2D solute transport simulations (analytical solutions) were conducted based on regional groundwater maps and 13 years of monthly groundwater levels from dozens of production wells to determine the most likely MTBE source areas. A customized GIS framework was developed to evaluate source-area probability. Accepted by the Central Coast Regional Water Quality Control Board – *Monterey County Water Resources Agency, Salinas MTBE Investigation, Salinas, California*.
- Conducted a technical evaluation and provided detailed comments regarding the hydrologic analysis undertaken for the draft environmental impact report/environmental impact statement for the proposed Monterey Peninsula Water Supply Project (MPWSP) - *Third-Party Evaluation of Hydrologic Analysis Conducted for Monterey Peninsula Water Supply Project, City of Marina, California*.

#### **Summary of Other Selected Water Supply Projects**

- Two local-scale groundwater flow (MODFLOW) and solute transport models (MT3DMS) were developed for two sub-regions of the USGS regional Antelope Valley MODFLOW model to evaluate the performance of a new groundwater bank. Updated geologic characterization was based on recent investigations by the USGS and sparse well logs. Groundwater bank performance was evaluated with respect to water quantity and quality for various operational strategies, including well placement and infiltration schedules – *Antelope Valley-East Kern Water Agency (AVEK), Groundwater Banking and Blending Study, Palmdale, California*.
- Developed and calibrated three-dimensional, groundwater flow (MODFLOW) and solute transport models (MT3DMS) to assess water sources for a new 20 MGD water treatment plant. A detailed geologic model was developed for this project to assess the extent of the deep target aquifer, evaluate the risk from a heavy industrial area, well locations, long-term

performance, define the wellhead protection area, and optimize wellfield performance – *City of Longview, Design and Construction of a New Groundwater Source and Treatment Facility, Longview, Washington.*

- Pilot study to evaluate the feasibility of compressed air energy storage of renewable energy. Developed and implemented three-dimensional groundwater flow models (MODFLOW) to evaluate the impact on nearby wells of compressed air injection into a depleted natural-gas reservoir – *Pacific Gas and Electric (subcontractor to Jacobson James and Associates), Compressed Air Energy Storage Pilot Project, San Joaquin County, California.*
- Developed hydrostratigraphic model of the Mesquite Lake groundwater subbasin as interpreted from existing well logs and USGS studies that had been performed to the west and north. The hydrostratigraphic model was used as input to a three-dimensional, transient groundwater flow model (MODFLOW) that assessed the volume of water available for a new municipal water treatment plant – *Twentynine Palms Water District, Groundwater Study for the Mesquite Lake Subbasin, Twentynine Palms, California.*
- Developed a calibrated two-dimensional, steady-state analytical groundwater flow model for the Rialto-Colton Basin. The calibrated model was used to delineate source areas for two impacted production wells for a CDPH 97-005 permit application – *West Valley Water District, Wellhead Treatment Project, Rialto, California.*
- Analyzed the results of aquifer tests of multiple water supply wells completed in a fractured-rock aquifer – *Lake Don Pedro Community Services District, California (subcontractor to SGI The Source Group).*
- Analyzed the results of a complex aquifer-test dataset to determine aquifer properties and assess groundwater availability. Characterized groundwater quality and assessed regional impact of developing a new water supply – *Silver Oak Cellars (subcontractor to Taber Consultants), Aquifer Test Analysis and Groundwater Availability Study, Sonoma County, California.*
- A well and a spring were evaluated in terms of water quality, influence of surface water, source area, and zone of influence for a license application to operate a new private water supply – *Buster's on the Mountain (subcontractor to Taber Consultants), Hydrogeology Report for New Private Water Supply, Napa County, California.*
- Groundwater flow modeling, aquifer test results, and qualitative hydrogeological analyses were reviewed and critiqued for accuracy and completeness to assess the feasibility of a gravel mining operation adjacent to the upper reaches of a major river in Los Angeles and Ventura counties. The assessment formed the basis for communications with the State Water Resources Control Board regarding appropriative water rights. In the second phase of the project, a new MODFLOW model was developed to assess groundwater-surface water interactions – *Confidential Client (subcontractor to Todd Engineers), Groundwater Pumping Impacts on Streamflow, Los Angeles County, California.*

- Developed complex geologic model in the fold-thrust terrane of the Las Posas Basin in eastern Ventura County. The geologic model formed the foundation for preliminary wellfield design and estimation of available groundwater for desalter operations in a strictly managed aquifer – *Calleguas Municipal Water District, Somis Desalter Feasibility Study, Las Posas Basin, Ventura County, California.*
- Evaluated geologic, hydrologic, and hydrogeologic data to assess the suitability for establishing a groundwater banking operation. Provided recommendations on further field-based and modeling studies deemed necessary to address data and knowledge gaps – *Los Angeles Department of Water and Power, Evaluation of Proposed Water Storage/Transfer Potential in Fremont Valley Basin, Fremont Valley, California.*
- Evaluated the groundwater component of an existing water-budget model. Implemented changes to include the effects on water levels from climate and distant municipal pumping in deeper parts of the aquifer. The improvements facilitated the development and simulation of future “what-if” scenarios used to design an engineered wetland that used stormwater runoff and groundwater pumping to maintain lake levels – *San Francisco Public Utilities Commission, Lake Merced Water-Budget Model, San Francisco, California.*

#### **Summary of Other Selected Water Quality Projects**

- Developed three-dimensional, variably saturated flow and reactive transport models (MODFLOW-SURFACT) to assess the groundwater impact from arsenic and boron in recharged partially treated oilfield produced water. Transport through the unsaturated and saturated zones related to groundwater banking operations were simulated. Regulatory approval was granted by the Central Valley Regional Water Quality Control Board – *Cawelo Water District, Groundwater Banking Waste Discharge Requirements Support, Central Valley, California.*
- A calibrated transient three-dimensional model (MODFLOW and MT3DMS) of groundwater flow and solute transport was developed, calibrated, evaluated, to compare estimated timeframes to achieve RAOs for three alternatives. Site data were used to characterize the subsurface and estimate land application rates and water quality of applied water. Regulatory approval was granted by the Central Valley Regional Water Quality Control Board – *Hilmar Cheese Company, Groundwater Modeling for Cleanup and Abatement Order, Central Valley, California.*
- The results of two modeling efforts were reviewed to reassess contributions from responsible parties. A new metric, the Responsibility Factor (RF), was developed and applied to existing input data. The RFs were used to estimate relative contributions to the MEW Superfund site regional plume from several responsible parties – *Confidential Client (subcontractor to Montclair Environmental Management), Reassessment of Contributions to the MEW Superfund Site Regional Plume, Santa Clara County, California.*
- Mass flux calculations for TCE and PCE were conducted on behalf of a multi-PRP group. Calculations of mass flux through time were compared upgradient and downgradient of several sites within the Omega Superfund site regional plume to estimate the contribution



from each individual site. These calculations were used as part of the basis for cost allocation among PRPs – *Confidential Client, Mass Flux Calculations for Cost Allocation, Omega Superfund Site, Santa Fe Springs, California.*

- A three-dimensional model (MODFLOW-SURFACT) of unsaturated zone and saturated zone flow and solute transport was developed and calibrated based on sparse discharge records and well observations to assess the fate of a legacy of contaminated soil water being mobilized by increased discharge to the subsurface. The modeling was an integral part of a report of waste discharge and request for waste discharge requirements from the Central Valley Regional Water Quality Control Board – *California Dairies, Incorporated, Report of Waste Discharge, Central Valley, California.*
- A transient groundwater flow model (MODFLOW) was conceptualized, implemented, and calibrated for a major oil refinery. Linear programming was used to quantitatively minimize groundwater pumping and qualitatively optimize well placement for containment of subsurface LNAPL and BTEX-contaminated groundwater. Multiple capture zones of various sizes were analyzed for control of LNAPL hotspots and site-wide containment scenarios – *Sun Oil Company, Pumping-Rate Optimization and Capture Zone Analysis, Tulsa County, Oklahoma.*
- A groundwater flow and reactive solute transport model (MODFLOW and RT3D) was developed to evaluate remediation efforts at a chemical production facility. The efficacy of a permeable reactive barrier was evaluated by simulating sequential decay and transport of TCE and its daughter products. The model was post-verified in the field by analyzing the concentration histories of several observation wells – *Mohawk Laboratories, Analysis of Permeable Reactive Barrier, Sunnyvale, California.*
- Determined regional-scale risk to groundwater from potentially contaminating activities (PCA) in the Santa Clara Valley, Coyote, and Llagas subbasins, as part of a multifaceted effort. A regional-scale PCA-risk map was developed and combined with intrinsic aquifer sensitivity to generate a groundwater vulnerability map, which formed the basis of a web-based GIS tool for evaluating development projects and land-use changes – *Santa Clara Valley Water District, Groundwater Vulnerability Study, Santa Clara, California.*
- A Remedial Investigation (RI) Summary report was prepared under CERCLA guidelines, which included development of a conceptual model that incorporated regional and local hydrostratigraphy, source-area history, details of previous remedial investigations, and characterization of the basin-wide perchlorate and TCE groundwater contamination – *West Valley Water District, NCP Compliance Documents, Rialto, California.*
- The volume of LNAPLs beneath a refinery was estimated by modifying the analytical solutions for LNAPL recovery presented within API Publications 4682 and 4729, utilizing the van Genuchten relations for porous media. Results of the modeling work were used to design a LNAPL recovery system – *Sun Oil Company, LNAPL Spatial Distribution, Tulsa County, Oklahoma.*

- DNAPL Assessment Techniques, Klickitat County, WA. Developed internal White Paper describing techniques and thresholds for assessing DNAPL mobility at a fueling facility – *BNSF, Remediation Design Support, Park County, Montana.*
- Report of waste discharge and request for waste discharge requirements for land application of onsite waste and storm water. For submission to the Los Angeles Regional Water Quality Control Board – *Confidential Client, Report of Waste Discharge, Los Angeles County, California.*
- Developed and implemented groundwater flow and particle tracking models to evaluate well placement designs and optimize pumping rates for an in-situ groundwater recirculation and treatment zone. The recirculation zone was used to chemically treat groundwater contaminated with VOCs – *BNSF, Remediation Design Support, Park County, Montana.*
- Analyzed slug test data for multiple tests using several techniques to assess parameter uncertainty for a bedrock aquifer, for submission to Montana Department of Environmental Quality – *BNSF, Site Characterization for Remedial Investigation, Park County, Montana.*
- A 1D unsaturated zone flow and transport model was developed to assess the impact to groundwater of VOCs and metals present in the soil at the Facility. A future 100-year scenario was developed based on climate data from the past 100 years. Mass transport process of volatilization, linear sorption, and advection and dispersion were considered for this investigation – *SMTEK, Former Chemical Facility, Orange County, California.*

#### **Summary of Other Selected Litigation Support Projects**

- Implemented detailed regional, three-dimensional conceptual model for a 35-year period (MODFLOW and MT3DMS). Geologic data, crop-based time-variant DBCP application rates, pumping, recharge basins, and flow and transport in the unsaturated and saturated zones were used to evaluate whether label-recommended use of DBCP caused contamination in municipal wells and to establish likely source areas for high-concentration hot spots – *Sedgwick, Detert, Moran, and Arnold, Regional-Scale Pesticide Contamination Litigation Support, Fresno, California.*
- Designed and implemented three-dimensional models (LEACHM, MODFLOW, and MT3DMS) of unsaturated and saturated fluid flow and solute transport for periods of up to 150-years using soils and geologic data, rainfall records, pumping, and plant operational history to assess whether off-site groundwater contamination was caused by unanticipated releases of coal tar at numerous sites in the Midwest – *Jones, Day, Reavis, and Pogue, Former Manufactured-Gas Plant Sites, Litigation Support, Los Angeles, California.*
- The impact of different rainfall data disaggregation techniques on the results of fluid flow and solute transport simulations in the unsaturated zone was evaluated. Various disaggregation strategies were applied to simulations of contaminant fate at three former manufactured-gas plants – *Northern Indiana Public Service Company, Impact of Rainfall Data Disaggregation Techniques, Merrillville, Indiana.*

- Evaluated expert reports and thoroughly evaluated and verified a detailed water budget model. Assisted in preparation of expert report related to the application of the model – *Confidential Client, Water Budget Model Litigation Support, Pinal County, Arizona.*
- Evaluated expert reports and critiqued a detailed MODFLOW groundwater flow model for litigation of damages and fatalities from a landslide. Assisted in preparation of expert report – *Confidential Client, Landslide Initiation Litigation Support, British Columbia.*

## 2024 SCHEDULE OF FEES FOR CONSULTING SERVICES

### 1. Professional Services

Professional Services performed by personnel of **aquilogic** (including full-time, part-time, and contract staff) for hours spent on project activity, including office, field, and travel time, will be charged as follows (in U.S. Dollars):

Professional Personnel	Rate	Professional Personnel	Rate
Principal-in-Charge	\$450	Project Consultant	\$225
Senior Principal Consultant	\$380	Staff Consultant	\$185
Principal Consultant	\$355	Project Accountant (CPA)	\$235
Project Manager/ Senior Consultant	\$300	Intern or Technician	\$99

Unless otherwise agreed to in writing, time will be billed in half hour increments. All overtime (hourly or non-exempt support staff) will be billed at 1.25 times the above rates. Night, weekend, and holiday work requested by the client (all staff) will be billed at 1.25 times the above rates. Specialist services (e.g., consulting boards, advisory panels or similar specialist consultation, trial preparation) will be billed at 1.5 times the above rates (with a four-hour minimum). Deposition and trial testimony will be billed at \$900 per hour (with a four-hour minimum).

This fee schedule is effective for the calendar year indicated at the top of this page. **Aquilogic** will issue a new fee schedule in December of each year that will apply for services performed in the subsequent year unless a new separate, client-specific fee schedule is negotiated for any subsequent year.

### 2. Subsistence and Expenses

Living and travel expenses incurred by personnel of **aquilogic** associated with a project will be charged at cost plus twelve percent (12%). A fixed per diem can be negotiated for specific projects. All airline travel exceeding four hours airport gate to gate (on the most direct route) will be in business class.

### 3. Materials, Subcontracts, and Equipment Rental

Direct material, equipment, outside services, and other expenses contracted or incurred by **aquilogic** on behalf of a project will be charged at cost plus twelve percent (12%), excluding contract staff. These disbursements include but are not limited to: Field equipment (e.g., field vehicles, testing equipment); subcontractor services (e.g., laboratory analyses); materials and supplies (e.g., sampling supplies); and other expenses (e.g., work permits, bonds). Postage, non-overnight shipping, telephone (office and cellular), office computing, facsimile, photocopying (excluding color), and miscellaneous office supplies are now included in the hourly rate.

### 4. Billings

Statements normally will be issued monthly, or at the completion of the project, and are payable upon receipt, unless otherwise agreed in writing by **aquilogic**. Interest, at the rate of one percent (1%) per month, not to exceed the maximum rate allowed by law, will be payable on any amounts not paid within thirty (30) days; payment thereafter to be applied first to accrued interest and then to the principal unpaid amount. Unless otherwise specified in other contract documents or project proposal, all work on a project will cease should any invoice remain unpaid 60 days after the invoice has been submitted to the client. Work will not recommence until the account has been made current; that is, all outstanding invoices (including accrued interest) have been paid.

For projects where **aquilogic** experts are offering testimony at deposition, trial, and/or part of an administrative hearing, all outstanding invoices must be paid prior to such testimony.

### 5. Indemnity

**aquilogic** shall indemnify, defend, and hold Client harmless from and against all claims, liabilities, suits, loss, cost, expense and damages for injury to or death of persons or damage to or destruction of property arising in

connection with and to the extent of Consultant's negligence in the performance of the Services under this Agreement.

## **6. Warranty**

**aquilogic** warrants that the Services shall be performed in accordance with the standards customarily provided by an experienced and competent professional engineering organization performing the same or similar Services. Consultant shall re-perform at its own expense any of said Services which were not performed in accordance with this standard, provided that Consultant is notified in writing of the nonconformity within twelve (12) months after the performance of the deficient Services, and provided further that the cost to Consultant of such remedial Services shall not exceed the amount paid to Consultant under this Agreement. The foregoing are Consultant's entire responsibilities and Client's exclusive remedies for Services performed or to be performed hereunder, and no other warranties, guarantees, liabilities or obligations are to be implied.

## **7. Consequential Damages**

In no event shall **aquilogic** or its sub-consultants/sub-contractors or vendors of any tier be liable in contract, tort, strict liability, warranty, or otherwise for any special, indirect, incidental, or consequential damages such as but not limited to loss of product, loss of use, non-operation, or increased costs of operation of equipment or systems, loss of anticipated profits or revenue, costs of capital, or cost of purchased or replacement equipment or systems.

## **8. Limitation of Liability**

In no event shall the total aggregate liability of **aquilogic** exceed the amount paid by Client for the Services performed.

## **9. Disputes**

Any disputes between the Parties which arise out of this Agreement which cannot be settled amicably by the Parties shall be submitted to and settled under the arbitration rules of the American Arbitration Association with proceedings in Los Angeles, California. Such disputes shall be governed in accordance with the laws of the state of California, U.S.A.

## **10. Confidentiality**

**aquilogic** and the Client agree to keep confidential all Information supplied by others and not to utilize, either directly or indirectly, any information for any purpose other than related to Services being performed, or to disclose it to anyone, including partners and affiliated companies, except on a "need to know" basis, without prior written consent from the party providing said confidential information. If required, **aquilogic** and the Client shall execute a non-disclosure or confidentiality agreement (NDA) that further defines the provision, use and disclosure of confidential information.

## **11. Termination**

Client may at any time, by fifteen (15) days written notice to **aquilogic**, terminate all or any part of the unperformed Services under this Agreement. In such event, **aquilogic** shall be compensated for Services performed to the effective date of termination, plus the reasonable costs of demobilization and settlement of subcontracts, purchase orders, and other commitments incurred by **aquilogic** for performance of the Services.

## **12. Entire Agreement**

In the absence of any other executed agreement, this schedule of fees and accompanying proposal constitute the entire agreement between the Client and **aquilogic** for the Services to be performed. No modification shall be effective unless it is in writing and executed by both Parties. This Agreement supersedes any and all other agreements between the Parties, whether written or oral, with respect to the subject matter hereof.