

**TITLE**

President / Principal
Hydrogeologist

**REGISTRATIONS/
CERTIFICATIONS**

Registered Professional
Geologist, California
No. 7648

Certified
Hydrogeologist,
California No. 822

EDUCATION

MS, Environmental
Hydrogeology,
California State
University – Los
Angeles, 2006

BS, Geology, California
Polytechnic University –
Pomona, 1996

**PROFESSIONAL
AFFILIATIONS**

American Water Works
Association – past Chair
of CA/NV Water Well
Technology Committee

Voting Member of the
American Water Works
Association National
Well Standards
Committee

Mr. Kyle has more than 23 years experience providing groundwater-related consulting services for public and private clients within the western United States, Mexico, and Africa, with a focus on groundwater resources development in Southern California. He holds the philosophy that an honest, well-thought-out, innovative, and scientifically-based approach coupled with a high-quality work product, leads to success. The scope of his technical experience includes groundwater basin evaluations, water supply studies, well siting investigations, artificial recharge feasibility evaluations, well field condition assessments, well rehabilitation, desalination feedwater supply studies, and geophysical surveys. Over the course of his career he has provided permitting, design, construction, and inspection services for more than 150 water supply wells and 70 monitoring wells and exploratory borings, including permitting, design, construction management, and inspection, and has successfully evaluated and rehabilitated dozens of wells to stabilize structural abnormalities, recover lost production and improve poor water quality. He is a Professional Geologist and Certified California Hydrogeologist, and is active within the water resources community, currently serving as past-Chair to the AWWA CA-NV Water Well Technology Committee, and as a voting member of the AWWA National Well Standards Committee. Recent notable projects include a regional well site and collection main study for the Long Beach Water Department, installation of potable water supply wells for California Water Service Company, South Montebello Irrigation District, Golden State Water Company, and Long Beach Water Department, and development of well rehabilitation and replacement prioritization plans for Palmdale Water District, Long Beach Water Department, California Water Service Company, and City of Riverside.

EXPERIENCE**NEW WELL INSTALLATION**

Collection Main and New Well Site Study – Long Beach Water Department – Long Beach, California. The Long Beach Water Department (LBWD) currently owns and operates 28 groundwater supply wells located throughout the city, in addition to a new well currently being equipped, and a second well recently constructed. LBWD's goal is to optimize local water supply sources and maintain a production well field with suitable capacity through the year 2032. Mr. Kyle is serving as Principal-in-Charge for a well siting study to evaluate areas favorable for installation of new production wells within the Central and West Coast Basins, and within relative proximity to the existing collection main pipeline. Buffers around sites of environmental concern, existing wells, and active hazardous liquid pipelines were used to eliminate possible areas for a new potable well. Potential sites were identified within areas that did not fall within those buffers and were within a one-mile radius of the collection main pipeline. The sites were ranked based upon a scientific approach and weighted decision matrix and an evaluation of how each potential well site will impact the collection main system.

Dominguez District Well 300-01 – California Water Service Company - Compton, California. Mr. Kyle provided an hydrogeological services in support of a new well installation in Compton, including a feasibility assessment of the proposed well site. Specific project support tasks include preparation of a risk assessment and preliminary design report, and preparation of DWSAP documents. Construction management and inspection services were provided during installation of the well which was completed June 2020. The well has successfully been installed with no water quality issues.

Well No. 8 – South Montebello Irrigation District – Montebello, California. Mr. Kyle was the technical lead for a new well installation to be located adjacent to the Rio Hondo Spreading Basins within the Montebello Forebay area of the Central Basin. Mr. Kyle provided an assessment of the proposed well site, including anticipated well capacity and groundwater quality, preliminary design, construction logistics, and identification of construction constraints and required permits. Specific project support tasks include preparation of technical plans and specifications, CEQA, NPDES permitting, application for the Domestic Water Supply Permit Amendment, and preparation of DWSAP documents. Bid support, construction management and inspection services were also provided and the well installation was successfully completed in May 2020.

Well No. 15 – Montebello Land & Water Company – Montebello, California. Mr. Kyle is providing hydrogeological support services during siting and installation of a new water supply well in the Montebello Forebay area of the Central Basin. Mr. Kyle provided permitting support, an assessment of the proposed well site, and developed detailed technical specifications for drilling and construction. The project is expected to enter the construction phase in August 2020.

Design and Installation of City of Banning Well C-8 – City of Banning – Banning, California. The City of Banning is seeking to install a new municipal water supply well to increase groundwater production capacity to meet future demands. Mr. Kyle has conducted a water supply feasibility study, a well site assessment and ranking, and a preliminary design assessment, including a well field interference analysis, anticipated well capacity and groundwater quality, construction logistics, and identification of construction constraints and required permits, and an assessment of an existing inactive well for return to service. Next steps include permitting, preparation of technical specifications, bidding, construction management, inspection, and final design.

Well No. 187 – Lake Arrowhead Community Services District – Blue Jay, California. Mr. Kyle is providing hydrogeological support services during siting and installation of a new hard-rock water supply well in the San Bernardino Mountains. Mr. Kyle provided permitting support, an assessment of the proposed well site and preliminary design, and developed detailed technical specifications for drilling and construction. The project is expected to enter the construction phase late-2020.

Dominguez District Well 301-01 – California Water Service Company – Long Beach, California. Mr. Kyle provided hydrogeological support for a planned well in Long Beach, including a feasibility assessment of the proposed well site. Specific project support tasks included preparation a preliminary design report, site feasibility assessment, and DWSAP documents. A risk assessment and professional opinion were prepared in response to concerns from the State Water Resources Control Board and the well has been cleared for the construction phase.

West Coast Basin Well 1 – Long Beach Water Department – Long Beach, California. The Long Beach Water Department (LBWD) installed a new potable water supply well in the West Coast Basin. This well will be the only well within the system which will not be treated by the District’s centralized water treatment facility, and as such, water quality was of paramount import. Mr. Kyle served as project manager to provide design, permitting, construction management, and inspection services during the project.

The well was successfully completed despite significant logistical challenges and was tested at 2,000 gpm with a specific capacity of approximately 100 gpm/ft.

Dominguez District Well 216-02 – California Water Service Company - Carson, California. Mr. Kyle provided design and construction inspection services for a new high-capacity water supply well in Carson to augment the District's groundwater supply within the West Coast Basin. A professional opinion of risk to the well from nearby groundwater contaminants was performed to assist CWSC with permitting the well for operation. The permits were secured and the well has been successfully constructed with a specific capacity of approximately 150 gpm/ft at 2,000 gpm.

Replacement Well Commission 22A – Long Beach Water Department – Long Beach, California. The Long Beach Water Department (LBWD) owns and operates three wells adjacent to the San Gabriel River in El Dorado Park North. One of these wells, Commission 22, is structurally compromised due to corrosion of its mild steel wire-wrap well screen, resulting in the well being removed from service. LBWD plans on legally destroying Commission 22 and replacing it with a new well, Commission 22A, in the general vicinity of the existing well. Mr. Kyle served as project manager to provide design, permitting, construction management, and inspection services.

East Los Angeles Well 62-02 – California Water Service Company - Commerce, California. Mr. Kyle provided design and construction inspection services for a new high-capacity water supply well in Commerce to augment the District's groundwater supply. Deep aquifer units in the area are impacted with various constituents of concern, including methane, ammonia, and sulfides, while the shallow aquifers are impacted by manganese and local industrial contaminants. The well has been successfully constructed within both aquifer regimes and plans are in place to temporarily backfill the lower well screen with the goal of treating groundwater from those aquifers at a future date.

Gibbel Park Well – City of Hemet – Hemet, California. The City of Hemet is seeking to increase local groundwater supply through installation of a new production well at Gibbel Park. Mr. Kyle provided project management, design, and inspection services during drilling of an exploratory borehole and installation of a nested monitoring well to evaluate depth-specific water quality. The area is subject to many groundwater quality issues, including elevated metals from upwelling of hot water through the area's many faults, and impacts from agricultural activity within the valley. Information gathered from the exploratory drilling and testing will be utilized to assess the feasibility of installing a production well at Gibbel Park, and as a basis of design.

Replacement Well 10A – City of Hemet – Hemet, California. The City of Hemet installed a replacement municipal well at the site of a recently abandoned well within a residential area. The well site is very small and offered numerous logistical problems, including close proximity to residences and sensitive noise receptors. Mr. Kyle served as project manager to provide well design, construction management, and inspection services during the project.

Plant 211 Well 3 – Suburban Water Systems - Whittier, California. Mr. Kyle was the technical lead for an exploratory drilling program in Whittier, California at the site of two abandoned wells. Mr. Kyle provided an assessment of the proposed well site as to its

feasibility for a potable water well site, including anticipated well capacity and groundwater quality, preliminary design, construction logistics, and identification of construction constraints and required permits. A multiple completion monitoring well was subsequently installed to assess the aquifer systems and depth-specific groundwater quality prior to installing a potable water supply well.

Groundwater Supply Development – Nuevo Water Company - Nuevo, California. The City of Nuevo anticipates considerable growth over the next few decades. To maintain current production demand and provide system redundancy, Nuevo Water Company must add at least one more production well to their system. To that end, a well siting study was performed to locate areas with potentially suitable groundwater quality and yield. This study, along with the location of existing conveyance infrastructure, was utilized to identify several locations that may serve as suitable locations for future wells. Mr. Kyle also provided design and construction inspection services during installation of a test production well in an area contaminated with high total dissolved solids and nitrate.

LHUD Well 3 – Lost Hills Utility District - Wasco, California. Mr. Kyle provided hydrogeological services to evaluate the feasibility of installing a new municipal supply well which will serve as a source of groundwater with low arsenic concentrations. Mr. Kyle provided a hydrogeological assessment of the proposed well site and provided plans for construction of a multiple completion monitoring well. Data from the monitoring well will be used to evaluate hydrogeological conditions, evaluate project feasibility, and prepare a preliminary production well design.

Chino Basin Desalter Phase 3 Project – Chino Basin Desalter Authority - Chino Basin, California. Mr. Kyle provided project management, construction management, and technical support for siting, design, and installation of new groundwater supply wells in the Chino Basin. The purpose of the wells is to expand production of non-potable water as a source of feedwater to the Chino I and II Desalters, and to establish hydraulic control of the Chino Basin. Three wells were successfully installed in the Chino Creek area, near the Chino I Desalter. Additionally, two (2) wells were sited and constructed in the vicinity of the Chino II Desalter. Water level and water quality impacts from expansion of the desalter system were evaluated through groundwater modeling.

Preliminary Design of the Tustin Legacy Well – Irvine Ranch Water District – Tustin, California. Mr. Kyle prepared preliminary design and source water assessment documents for a new well to be located at the Tustin Legacy project in Tustin. Of particular concern are the numerous cleanup sites associated with the closed Marine Corps Air Station and the South Basin cleanup area, and naturally occurring contaminants of concern such as TDS, nitrate, color, and odor.

Siting of a New Municipal Water Supply Well in Whittier Narrows Area – Puente Basin Water Agency – Whittier, California. Puente Basin Water Agency owns groundwater pumping rights within the Central Basin and is seeking to construct one or more wells in the Whittier area. The goal is to produce potable groundwater from the Central Basin and convey it to the Puente Subbasin through an existing California Domestic Water Company transmission pipeline. Several potential sites have been identified as candidates for the new well and Mr. Kyle is tasked with assessing each site,

quantifying the assessment through a decision matrix, ranking sites according to suitability, and assessing construction feasibility of the highest ranked sites.

Municipal Well Relocation Project – Hillwood Investment Properties - San Bernardino, California. Mr. Kyle was the technical project lead for a project involving relocation of two existing production wells to make room for construction of a large warehouse. This time-critical project involved constructing two new wells prior to destruction of the existing wells, all of which occurred under clear and immovable deadlines on the part of the developer. Mr. Kyle worked with the developer, the equipping engineer, the City of Riverside, the City’s hydrogeologist, and the drilling contractor to accomplish this goal and provided technical specifications, bidding support, construction management, design, and inspection services. Both wells have been successfully constructed, developed, and tested at production rates of up to 5,500 gpm.

Regional Recharge and Recovery Project (R-Cubed) – Mojave Water Agency - Hesperia, California. The Mojave Water Agency was formed to manage ground water resources, and coordinate water producers in the high desert area, also receiving and distributing State Water Project (SWP) water to various recharge facilities. The ultimate goal of the project was to recharge up to 40,000 acre-ft of SWP water through a system of extraction wells, monitoring wells, pumping stations, reservoirs, and conveyance pipelines. A preliminary hydrogeological feasibility assessment was conducted to assess groundwater level response to aquifer recharge, and to determine the optimal locations for extraction wells. Mr. Kyle was the lead project manager for the hydrogeological portions of the project, providing groundwater modeling support, well field interference evaluations, steel corrosion studies, and installation of six high capacity wells. All Phase 1 wells have been successfully completed and have been pumped at rates exceeding 4,000 gpm with specific capacities in excess of 140 gpm/ft.

Well No. 6 – Sativa Los Angeles County Water District – Compton, California. Mr. Kyle has provided technical support to the District prior to well installation, including design recommendations, preliminary source water assessment documents, CEQA documentation, and DDW permitting support.

La Bonita and Portola Park Municipal Wells – City of La Habra - La Habra, California. Mr. Kyle was the technical lead and construction manager during siting, design, and installation two (2) high capacity municipal water supply wells to augment the City’s local water supply. Both wells were successfully constructed and are on-line and operational.

Construction of Well No. 10 – City of Norwalk – Norwalk, California. Mr. Kyle was the project manager and technical lead during installation of a high capacity municipal supply well for the City of Norwalk. The well was successfully completed in a problematic location despite difficult design considerations.

Construction of Well No. 12 – City of Santa Fe Springs – Santa Fe Springs, California. Mr. Kyle was the project manager and technical lead during installation of a high capacity municipal supply well for the City of Santa Fe Springs. He provided project management during permitting, preparation of preliminary design and bid package,

construction management, and field inspection services. The well was successfully constructed with a recommended pumping rate of 2,000 gpm.

Construction of Dace Well No. 2 – Golden State Water Company – Norwalk, California. Mr. Kyle was the project manager and technical lead during installation of a municipal supply well which would serve as a replacement to nearby Dace Well No. 1, impacted by volatile organic compounds and requiring well head treatment. He provided project management during permitting, siting, preliminary and final design, bidding, construction management, and field inspection services. The well was successfully constructed without any groundwater quality issues.

Baseline Feeder Well Replacement Project – San Bernardino Valley Municipal Water District - San Bernardino, California. Mr. Kyle served as project manager during installation of two high capacity production wells to provide water for the Baseline Feeder Pipeline which serves West Valley Water District, the City of Rialto, and Riverside Highland Water Company. The scope of work included preparation of preliminary design, including oversight of a subsurface geophysical fault investigation, preparation of technical specifications, bidding support, and design and installation of the wells. Both wells were successfully completed on schedule and within budget. The recommended pumping rates of the wells were 3,500 and 3,000 gpm with associated specific capacities of 70 and 54 gpm/ft.

Design and Construction of Well No. 9 – City of Torrance – Torrance, California. Mr. Kyle was technical lead during installation of a new municipal supply well for the City. The project included preliminary and final design, bidding, construction management, and inspection services during construction. The well was successfully completed with a recommended pumping rate of 3,000 gpm, in excess of the anticipated capacity.

Installation of Five (5) New Wells – Rancho California Water District - Temecula, California – Mr. Kyle was the project lead responsible for preliminary design and permitting of five (5) replacement production wells upon logistically difficult sites.

Design and Construction of High Capacity Well No. 1 – City of Bellflower – Bellflower, California. Mr. Kyle was technical lead providing professional hydrogeologic services during installation of a new municipal supply well for the City, the purpose of which was to replace several active wells identified for retirement by the Department of Drinking Water. The project included well siting, preliminary and final design, bidding, construction management, and inspection services during construction. The well was successfully completed with a recommended pumping rate of 3,500 gpm, with an associated specific capacity of 110 gpm/ft.

Installation of Two (2) Municipal Supply Wells – Highland Fairview – Moreno Valley, California. Mr. Kyle was technical lead providing hydrogeologic during installation of two (2) municipal water supply wells to support a new development in Moreno Valley. The project include assessment of existing wells, well siting, design, bidding, construction management, and inspection services during construction. The wells were successfully completed with a combined pumping capacity of 2,000 gpm.

Installation of Well Nos. 25 and 26 – Beaumont Cherry Valley Water District - Beaumont, California. Mr. Kyle was technical lead and project manager during

installation of two (2) municipal water supply wells in Beaumont. The project included design, bidding, construction management, and inspection services. The wells were successfully completed within a historically low-producing hydrogeologic area with a combined pumping capacity of 4,300 gpm.

WELL ASSESSMENT & REHABILITATION

Development of a Rehabilitation Prioritization Plan – Palmdale Water District – Palmdale, California. Mr. Kyle developed a rehabilitation and replacement prioritization plan for the Palmdale Water District well field, consisting of 22 actively pumping wells. This project involved a thorough evaluation and ranking of each well as to rehabilitation feasibility and estimated remaining well life. Additional components of the project included development of modular technical specifications for well rehabilitation, and rehabilitation of up to three (3) wells, including technical specifications and bid support.

Rehabilitation and Redevelopment of Well 46-1R – Gage Canal Company – San Bernardino, California. Mr. Kyle performed a condition assessment of a water supply well in response to excess sand production causing fouling of an adjacent treatment plant. A custom program of redevelopment was developed with the goal of mitigating sand production. Ultimately, redevelopment was deemed a success, significantly reducing sand production and increasing the specific capacity of the well to values greater than when the well was originally constructed in 2007.

Rehabilitation and Redevelopment of Well No. 23 – Desert Water Authority – Palm Springs, California. Mr. Kyle performed a condition assessment and efficiency testing of a water supply well in response to reduced production and specific capacity. The data review revealed the well to be severely clogged and fouled with mineral encrustation and bacterial growth, and containing excessive fill material. A custom work plan was developed with the goal of rehabilitating the well before reinstallation of the pump.

Rehabilitation and Redevelopment of Well 7A – Palmdale Water District – Palmdale, California. Mr. Kyle performed a well performance and condition assessment of Well 7A in response to severe structural failure of the well screen. Detailed technical specifications were developed with the goal of installing a partial well liner, allowing the well to continue to operate while planning for replacement.

Rehabilitation of Citizens Well 9 and Wilson Well 1A – Long Beach Water Department – Long Beach, California. Mr. Kyle is serving as project manager to provide construction management, inspection, and engineering services during rehabilitation of two municipal water supply wells. The project includes physical and chemical cleaning of each well, redevelopment and testing, and retrofitting of the well pump, motor, and electrical.

Rehabilitation of Citizens Well 7A and Commission Well 20 – Long Beach Water Department – Long Beach, California. Mr. Kyle served as project manager provide construction management, inspection, and engineering services during rehabilitation of two municipal water supply wells. The project included physical and chemical cleaning of each well, redevelopment and testing, and retrofitting of the well pump, motor, and electrical. Rehabilitation of Well 20 was successful despite significant structural issues

with the aging and corroded well casing and screen, and resulted in greater performance than when the well was constructed.

Well Assessments – City of Riverside Public Utilities (RPU) – Riverside, California. Mr. Kyle performed well condition assessments and developed well rehabilitation recommendations for four (4) production wells for RPU (Van Buren 1 and 2, the Stiles well, and Gage Well 46-1R). The well condition assessments included review of historical data, including multiple downhole video surveys, static and pumping groundwater levels, instantaneous pumping rates, specific capacity, and sand production. The data were analyzed to effectively evaluate the current condition of the three wells and develop programs for rehabilitation and redevelopment.

Plant 409 Well 3 Rehabilitation and Redevelopment – Suburban Water Systems – La Mirada, California. Mr. Kyle provided groundwater expertise to evaluate historical well data and develop a plan for rigorous well rehabilitation and redevelopment of an important water source in La Mirada, California. Results of the evaluation revealed that the efficiency of the pumping plant had declined significantly, likely due to clogging of the gravel envelope and near-well zone due to bacterial growth, poor design, and continuous operation of the well under high-drawdown conditions. Recommendations were provided regarding an appropriate course of action. A full rehabilitation and redevelopment program was developed, including mechanical and chemical cleaning, redevelopment, and testing. Well rehabilitation resulted in an increase in instantaneous pumping rate and well efficiency.

Wells W and Z – Indio Water Authority – Indio, California. Mr. Kyle an evaluation of Wells W and Z with the goal of assessing the feasibility of reducing hexavalent chromium concentrations below the California MCL through well modification rather than application of expensive water quality treatment. The work involved time-series, variable-flow, and depth-specific water quality and flow profile testing. Results suggested that well modification may result in a positive outcome which led to follow-on verification testing through use of inflatable pneumatic packers. This testing also indicated that favorable results could be achieved but further work was placed on hold due to revocation of the MCL.

Wells 3B and U – Indio Water Authority – Indio, California. Wells U and 3B had been out of service and idle for several years due to elevated hexavalent chromium. IWA decided to put the wells back in service when the 10 ug/L MCL was rescinded and Mr. Kyle was tasked with evaluating the wells and preparing a recommended course of action and associated work plan to rehabilitate and redevelop the wells. A plan for evaluating depth-specific water quality was also developed as it is the desire of IWA to evaluate the wells as to feasibility of improving water quality by well modification should the hexavalent chromium MCL be reinstated. Both wells have been successfully rehabilitated.

Well No. 9 Efficiency Testing – City of Torrance – Torrance, California. Mr. Kyle conducted well and pumping plant efficiency testing on a well which was exhibiting a decline in production capacity. Results of the testing revealed the pumping plant to be operating efficiently but a low well efficiency, likely due to clogging of the well intake structure, gravel envelope, and near-well zone. Recommendations were provided regarding an appropriate course of action.

Well No. 9 Rehabilitation and Redevelopment – City of Torrance – Torrance, California. Mr. Kyle conducted well and pumping plant efficiency testing on a well which was exhibiting a decline in production capacity. Results of the testing revealed an efficiently operating pump but very low well efficiency, likely due to clogging of the well intake structure, gravel envelope, and near-well zone. A full rehabilitation and redevelopment program was developed, including mechanical and chemical cleaning, redevelopment, testing, and pump refurbishment, and is currently underway at the direction of Mr. Kyle. Well rehabilitation resulted in a doubling of well efficiency from 31% to 69% and a 33% increase in specific capacity.

Santa Maria Mira Flores Well No. 2 – Golden State Water Company – Santa Maria, California. Mr. Kyle performed a detailed assessment of a water supply well that developed several holes within the blank well casing adjacent to a coarse-grained aquifer. The purpose of the evaluation was to assess possible water quality changes in the well due to the casing holes, and to develop a cost effective plan for a long-lasting repair. The evaluation includes a review of well construction details, performance characteristics, hydrogeological conditions, historical groundwater quality, downhole video surveys, and CITM surveys. Ultimately, the recommendation was to leave the well in its current condition as the risk of damage through the repair process was too great.

Los Osos Rosina Well No. 1 – Golden State Water Company – Los Osos, California. Mr. Kyle is conducting a detailed assessment of a water supply well that has suffered from a sharp decline in specific capacity. The assessment includes an evaluation of well condition, historical performance data, water quality, and well and pump efficiency testing. The purpose of the assessment is to develop a well rehabilitation and redevelopment scope of work suitable for obtaining contractor cost estimates.

Lancaster Wells 1-01 and 1-03 Condition Assessment – California Water Service Company – Lancaster, California. Mr. Kyle performing a condition assessment for two water supply wells with the goal of developing a tailored well rehabilitation and retrofit program. The evaluation includes a review of well construction details, performance characteristics, hydrogeological conditions, and well and pumping plant efficiency testing.

Downey Wells 2, 8, 11, 17, 18, and 29 Condition Assessment – City of Downey – Downey, California. Mr. Kyle performed condition assessments for three water supply wells and developed tailored well rehabilitation and retrofit programs. The evaluation included a review of well construction details, video surveys, performance characteristics, hydrogeological conditions, and well and pumping plant efficiency testing. Well rehabilitation consisted of mechanical and chemical cleaning followed by redevelopment and testing, for which field inspection was provided for three (3) of the wells. In particular, Well 11 responded well and demonstrated a significant increase in plant efficiency and an estimated annual electrical savings of \$69,000 per year.

Rehabilitation and Redevelopment of Dominguez Well 294-01 – Carson, California. Mr. Kyle served as technical lead, providing project management and support during rehabilitation and redevelopment of a well that was to provide raw water to an onsite treatment plant. The well had sat idle for many years due to groundwater contamination and had lost significant production capacity. This time-critical project involved evaluation and development of a rehabilitation program, acquisition of

contractor bids, coordination of schedule, and inspection during rehabilitation of the well. Ultimately the well was returned to a production capacity in excess of the original capacity, on-time, and within budget.

Evaluation of the North Orange Well Field – Riverside Public Utilities - Riverside, California. Mr. Kyle provided an evaluation of the capacity of the City of Riverside's North Orange Well Field to support increased yield through well rehabilitation and installation of potable and non-potable wells. Conducted predictive modeling to estimate ground water level impacts to the City's existing wells and to optimize production operations.

Rehabilitation and Redevelopment of City of Lynwood Wells 11 and 19 – Lynwood, California. Provided consulting services and technical support to the City of Lynwood during evaluation, rehabilitation and redevelopment of two wells that were exhibiting a variety of issues, including structural failure, decreased yield, and entrained sand/gravel pack. Both wells were successfully redeveloped and are being placed back in to service.

Municipal Well Water Quality Evaluation – City of Santa Fe Springs, California. Mr. Kyle provided technical support to the City to evaluate a recently equipped municipal water supply well which was exhibiting changes in groundwater quality from when it was initially constructed. A program of field testing suggested passive vertical groundwater flow between aquifers and possible issues with sampling protocols.

Development of a Rehabilitation and Monitoring Program – Riverside Public Utilities - City of Riverside, California. Mr. Kyle provided project management and technical support for development of a rehabilitation program for the City of Riverside Public Utilities well field, consisting of 55 actively pumping wells. This project involved a thorough evaluation and ranking of each well as to rehabilitation feasibility and estimated remaining well life. An additional component of the project was an evaluation of the City's current monitoring network and protocols, and development of a ground water monitoring program.

Rehabilitation and Redevelopment of Municipal Supply Well 154 – Temecula, California. Mr. Kyle served as project lead, providing project management and technical support during evaluation, rehabilitation and redevelopment for a well that was drilled in the 1994 but was never equipped due to well yield being significantly lower than surrounding wells. A program of mechanical and chemical rehabilitation and redevelopment resulted in a doubling of the well yield and a dramatic increase in the specific capacity of the well despite significant declines in regional groundwater levels.

Rehabilitation and Redevelopment of Rialto Well 6 – West Valley Water District - Rialto, California. Provided project management, technical support, contractor coordination, and inspection services during evaluation, rehabilitation and redevelopment of a well contaminated with perchlorate. The purpose of the rehabilitation was to reduce problematic entrained sand to minimal levels such that the well could be provide a sediment-free source of feedwater to a fluidized bed reactor treatment plant. This project was challenging due to its time-critical nature and the need for water treatment prior to discharge.

Evaluation of Potential Impacts to Nearby Water Wells from Operation of Well Nos. 21 and 22 – Irvine Ranch Water District – Orange County, California. Irvine Ranch Water District (IRWD) Well Nos. 21 and 22, located in the City of Tustin, were constructed in 1992 but due to the prohibitive cost of treatment for elevated concentrations of total dissolved solids and nitrate, the wells were never equipped or utilized. As a result of increased growth in southern California since the time of drilling, and because of the need to increase its local water supply, IRWD decided to evaluate the production capability and water quality characteristics of the wells in order to assess the cost effectiveness of placing the wells into service. Rehabilitation and redevelopment of the wells took place from 2008 to 2009 and it was determined that the groundwater produced was unsuitable for potable use without treatment, resulting in construction of groundwater production, conveyance, and treatment facilities such that the impaired groundwater could be put to beneficial use. As a result of putting the wells into service, IRWD would be pumping above their allocated baseline pumping for the Orange County Basin and would potentially impact the production capacity and cost of production for nearby water purveyors. Mr. Kyle was tasked with identifying and quantifying these potential impacts from operation of the wells. This study included a validation and evaluation of existing OCWD groundwater flow model results, coordination with IRWD, OCWD, and impacted water purveyors, acquisition and review of data, interviewing of water operations staff, review and evaluation of current operating conditions for impacted wells, and analysis and determination of physical and financial impacts under numerous operational scenarios.

CONJUNCTIVE USE

Hydrogeologic Evaluation of Artificial Recharge Potential – Big Bear Area Regional Wastewater Authority - Big Bear Lake, California. The goal of this project was to evaluate the feasibility of recharging local aquifers within the San Bernardino Mountains with treated wastewater in an effort to conserve local resources. Mr. Kyle provided field oversight and coordination during drilling of exploratory boreholes and installation of monitoring wells, soil moisture instrumentation, weather instruments, etc. at two pilot-scale study areas. He also coordinated and conducted two pilot-scale recharge tests which included sulfur hexafluoride groundwater tracer studies to determine CDPH minimum residence time. Mr. Kyle conducted data analysis and was the primary author of a summary report.

Evaluation of Artificial Recharge Potential – Jurupa Community Services District - Chino Basin, California. Conducted an evaluation of artificial recharge potential in the central and eastern portion of Chino Basin. The purpose of the evaluation was to provide a means to offset increased pumping by identifying alternatives for improving recharge in existing facilities and possible sites for construction of new facilities.

Noble Creek Artificial Recharge Pilot Study and Monitoring – Beaumont Cherry Valley Water District - Beaumont, California. Field supervised the drilling, installation and instrumentation of several uncased boreholes and monitoring wells. The wells were used to track the progress of percolating recharge water through a 500 ft vadose zone during preliminary feasibility pilot testing and full-scale artificial recharge operations. Prepared a Ground Water Recharge Implementation and Monitoring Plan for the full

scale recharge facility and was responsible for quarterly monitoring and reporting during early active operation of the recharge basins.

Raymond Ground Water Basin Future Conjunctive Use and Ground Water Storage Plan – Raymond Basin Management Board - San Gabriel Valley, California.

Evaluated the future ground water storage opportunities and management practices in the Raymond Basin. Prepared a technical memorandum presenting an analysis of current operational practices and strategies for future conjunctive use operations.

Mission and Bonsall Basins Artificial Recharge Program – San Diego County Water Authority, California. Performed field inspection for core drilling, ground water sampling, monitoring, well installation, pump testing, etc. to evaluate the geohydrology of the Mission and Bonsall Basins of the San Luis Rey River Watershed, San Diego County, to assess each basins ground water potential.

Aquifer Storage & Recovery Wells – Jurupa Community Services District - Jurupa Valley, California. Mr. Kyle provided project management during drilling and testing of 4 exploratory pilot boreholes to determine the feasibility of installing four (4) aquifer storage and recovery (ASR) wells in the eastern portion of the Chino Basin. The purpose of the ASR wells is to provide the opportunity to inject imported water to alleviate a significant local pumping depression. Two (2) ASR wells were subsequently installed with production capacities of up to 3,500 and 4,000 gpm and injection rates of approximately 2,000 gpm.

WATER RESOURCE MANAGEMENT

Well Field Condition Assessment – California Water Service Company - Los Angeles, California. Mr. Kyle was the project lead through an evaluation of an existing municipal well field. The purpose of the project was to evaluate the condition of existing facilities with the goal of determining maximum operational capacity with no negative impacts to ground water levels and quality. A plan was then developed to expand production facilities to maximize local resources and utilize all available groundwater rights.

Los Angeles Gateway Region Integrated Regional Water Management Plan – Los Angeles, California. Mr. Kyle provided ground water related analysis and support during stakeholder outreach, ground water quality characterization, development of management strategies, identification of projects, and preparation of IRWMP documents for a project spanning portions of the Central and West Coast Basins.

Baseline Ground Water Assessment / Hydrogeologic Evaluation of the Raymond Ground Water Basin – San Gabriel Valley, California. Mr. Kyle evaluated the geohydrology of the Raymond Basin, including aquifer properties, ground water storage, historical ground water levels, pumping, and ground water quality. Analyzed current ground water management practices. Performed a detailed analysis and prepared various technical memorandum's, and a comprehensive final report presenting the results, and detailed recommendations for improving ground water management practices for the future.

Raymond Ground Water Basin Ground Water Monitoring Plan – Raymond Basin Management Board - San Gabriel Valley, California. Assisted in the evaluation of current ground water monitoring and management practices in the Raymond Basin and prepared a technical memorandum presenting results and recommendations.

BASIN STUDIES

City of Victorville Southern California Logistics Airport Water System –Victorville, CA - Performed a detailed hydrogeologic evaluation of the Victorville area resulting in the recommendation of six areas for further exploration as potential ground water production well sites. The sites were evaluated with regard to potential for aquifer yield, natural ground water quality, potential for future ground water contamination, interference with other nearby wells, and logistical feasibility of location with respect to land ownership.

Baseline Ground Water Assessment / Hydrogeologic Evaluation of the Raymond Ground Water Basin – Raymond Basin Management Board - San Gabriel Valley, California. Evaluated the hydrogeology of the Raymond Basin, including aquifer properties, ground water storage, historical ground water levels, pumping, and ground water quality. Analyzed current ground water management practices. Performed a detailed analysis and prepared various technical memorandum's, and a comprehensive final report presenting the results, and detailed recommendations for improving ground water management practices for the future.

Hydrogeologic Evaluation of the College Park Development Area – SunCal Companies - Chino, California. Performed detailed hydrogeologic evaluation of five potential sites for high capacity ground water production wells. The sites were evaluated with regard to ground water quality and quantity, sources of potential contamination, interference with other nearby wells, and potential impact to nearby areas of land subsidence.

Re-evaluation of Maximum Perennial Yield – City of Big Bear Lake Department of Water and Power - Big Bear Lake, California. Developed a detailed hydrogeologic analysis of the Big Bear Lake watershed for the purpose of refining previous estimates of maximum perennial yield in the area and locating potential areas for additional ground water development. Included an evaluation of maximum perennial yield using the zero-net draft method and flownet analysis. As a result of the maximum perennial yield analysis, a comprehensive plan was developed for further drilling exploration and ground water development.

Large-Scale Pumping Test – San Diego County Water Authority - Oceanside, California. Conducted a large-scale pumping test to evaluate regionally characterize aquifers in the City of Oceanside and across the San Luis Rey River. Provided project management and technical support, and conducted analysis of data from multiple wells.

Box Springs Mutual Water Company – Moreno Valley, CA - Performed a water supply study in a hydrogeologically complex area of Moreno Valley with the goal of assessing the availability of groundwater to support a new water supply well.

DESALINATION

Oceanside Seawater Desalination Feasibility Study – Oceanside, California. Mr. Kyle was Project Manager for the latest phase of subsurface exploration to determine the feasibility of seawater desalination as an alternative source of potable water supply to a coastal community. The initial phases of the work included siting and installation of a nested monitoring well and test well to determine alluvial thickness, potential aquifer yield, and ground water quality. Subsequent phases included a one-year pumping test combined with pilot-scale RO test. The drilling portion of the final phase has been completed and consisted of seismic geophysical surveys, exploratory drilling utilizing the sonic drilling method, and nested monitoring well installation. The results of this phase provided the necessary data for siting of a vertical test well, and the groundwater quality data necessary to acquire a permit to discharge to the harbor. During the project, Mr. Kyle provided coordination with State, County, and local regulatory agencies, City departments, and subcontractors.

Seawater Desalination Supply Wells – Hacienda Resort - Baja California, Mexico. Provided project management, technical support, design services, and field inspection during a feasibility evaluation of the use of seawater as a source of feedwater to a reverse osmosis plant supporting a major resort. Favorable results from the feasibility evaluation ultimately led to successful siting and installation of one vertical seawater extraction well and two brine disposal wells.

Seawater Desalination Supply Wells – Vista Serena Resort - Baja California, Mexico. Provided project management, technical support, and field inspection for evaluation of the feasibility of using seawater as a source of feedwater to a reverse osmosis plant for a major beach resort east of Cabo San Lucas, Mexico. The feasibility evaluation included drilling of exploratory boreholes, installation and testing of a vertical test well, and installation of a monitoring well. Favorable results from the feasibility evaluation ultimately led to successful siting and installation of three vertical seawater extraction wells.

South Orange Coastal Ocean Desalination Project – Municipal Water District of Orange County - Dana Point, California. Provided technical support for a phased study into the feasibility of obtaining desalination feedwater supply from subsurface intakes at Doheny State Beach. Phase II work involved the design of a slant test well, an aquifer pumping test, ground water modeling, and water quality sampling and analyses. Provided coordination with laboratories, contractors, and state and county regulatory entities for major ground water and ocean water sampling events related to baseline water quality studies and NPDES permitting for ocean discharge events.

Chino Basin Desalter System Projects - Santa Ana Watershed Project Authority – Chino, California. Assisted in the development of a feasibility assessment for expansion of the Chino II Desalter. Acquired, managed, processed, and interpreted large amounts of hydrogeologic data. The purpose of the analysis was to predict potential pumping interference from a well field consisting of 25 wells. A separate analysis was also conducted to assess potential water quality changes in project and existing wells as a result of the project.

GEOPHYSICAL

Evaluation of Soil Thermal Conductivity – West Central Africa. Mr. Kyle provided support for a project in West Central Africa to determine soil thermal conductivities along a proposed oil pipeline from Chad to Cameroon. Involved in initial planning, site selection, and development of the project scope. Designed, constructed, and tested original geophysical field equipment and ultimately traveled to Africa to perform all necessary field work. Authored report summarizing findings and recommendations.

Geothermal Surveys – California and Minnesota. Conducted numerous aerial and subsurface geothermal surveys for the purpose of siting ground water production wells, determining leak locations within dams, and locating leachate leaks from landfill boundaries. Designed survey parameters and extents, performed field work, conducted analysis, and prepared reports documenting findings and recommendations.

Gravimetric Survey – Yucca Valley, CA. Performed a gravimetric survey for a major California water district. Responsible for project planning and acquisition, analysis, and interpretation of field data.

Ground Liquefaction Hazard Assessment – Client Confidential - Southern California. Provided technical review and direction of a complex statistical GIS-based model to assess the potential for earthquake induced ground motion due to liquefaction.

PUBLICATIONS AND PRESENTATIONS

- Well Site Selection, Design, Construction Workshop. Presented to: California Water Service Company. Torrance, CA. February 24, 2020
- Well Rehabilitation Workshop. Presented to: City of Riverside Public Utilities. Riverside, CA. January 29, 2020.
- Well Site Selection, Design, Construction, and Rehabilitation Workshop. Presented to: City of Banning. Banning, CA. January 28, 2020.
- Well Site Selection, Design, Construction, and Rehabilitation Workshop. Presented to: Long Beach Water Department. Long Beach, CA. November 12, 2019.
- Lessons Learned in Water Well Rehabilitation and Redevelopment. American Water Works Association CA-NV Section, Annual Fall Conference 2019. San Diego, CA. October 22, 2019.
- Lessons Learned in Water Well Rehabilitation and Redevelopment. American Water Works Association CA-NV Section, Water Education Seminar. Orange, CA. August 21, 2019.
- Final Well Design Utilizing Borehole Data. American Water Works Association CA-NV Section, Water Well Construction Workshop. Campbell, CA. November 8, 2018.
- Final Well Design Utilizing Borehole Data. American Water Works Association CA-NV Section, Water Education Seminar. Orange, CA. August 22, 2018.
- Final Well Design Utilizing Borehole Data. American Water Works Association CA-NV Section, Water Well Construction Workshop. Lakewood, CA. April 12, 2018.

- Groundwater Workshop - Well Site Selection, Design, Construction, and Testing. American Water Works Association CA-NV Section. Rancho Cucamonga, CA. August 29, 2017.
- Mechanisms for Clogging of the Well Intake Structure. American Water Works Association CA-NV Section. Water Well Rehabilitation Workshop. Lakewood, CA. May 18, 2017.
- Operator's Role in Collection of Useful Well Data. American Water Works Association CA-NV Section, Annual Spring Conference 2017. Anaheim, CA. April 13, 2017.
- Vertical Flow in Wells. American Water Works Association CA-NV Section, Annual Fall Conference 2016. San Diego, CA. October 26, 2016.
- Final Well Design Utilizing Borehole Data. American Water Works Association CA-NV Section, Water Well Construction Workshop. Campbell, CA. November 18, 2015.
- Analysis and Evaluation of Aquifer Pumping Test Data – What Can We Learn and What is Relevant. American Water Works Association CA-NV Section. Las Vegas, NV. October 27, 2015.
- Water in the West – An Update on Water Supply Challenges Facing California. Rotary Club International. May 2015.
- Desalination Update for the West: What's New? What has Changed? Where is it Going? American Water Works Association CA-NV Section. San Diego and San Jose, CA. May 19 and May 21, 2015.
- Operator's Symposium. Development of a Regional Well Rehabilitation and Replacement Program. American Water Works Association CA-NV Section. Ontario, CA. March 17, 2015.
- Groundwater Workshop - Well Site Selection, Design, Construction, and Testing. American Water Works Association CA-NV Section. Rancho Cucamonga, CA. February 25, 2015.
- Development of a Regional Well Rehabilitation and Replacement Program. American Water Works Association CA-NV Section. Reno, NV. October 21, 2014.
- American Water Works Association CA-NV Section, Water Well Design Workshop. Rancho Cucamonga, CA. October 1, 2014.
- Well Plumbness and Alignment Measurement and Standards. 30th Annual Tri-State Seminar. Las Vegas, NV. September 25, 2014.
- Well Drilling and Borehole Sampling. American Water Works Association CA-NV Section, Water Well Design and Construction Workshop. Lakewood, CA. February 26, 2013.
- Principles of Materials Selection for Well Casing and Screen. American Water Works Association CA-NV Section, Annual Fall Conference 2012. San Diego, CA. October 11, 2012.

- Subsurface Intake Systems – Case Studies for Seawater Desalination in Northern San Diego County. American Water Works Association CA-NV Section, Annual Fall Conference 2012. San Diego, CA. October 10, 2012.
- Elimination of Feedwater Pretreatment to Desalination Plants Using Subsurface Well Intake Systems - Applicability and Sustainability. Caribbean Desalination Association 2012 Conference & Exposition – “80 Years of Desalination Makes for One Happy Island.” Aruba. June 20, 2012.
- Utilization of Subsurface Slant and Vertical Well Intake Systems for Desalination Feedwater Supply. American Water Works Association CA-NV Section, Annual Fall Conference 2011. Reno, NV. October 20, 2011.
- Utilization of Subsurface Slant and Vertical Well Intake Systems for Desalination Feed Water Supplies. American Membrane Technology Association & South East Desalting Association 2011 Joint Conference & Exposition – “Membranes are the Solution”. Miami Beach, FL. July 19, 2011.
- Use of Slant Wells for Desalination Feed Water Supply - Case Study - Dana Point, CA. Workshop Presentation to the American Membrane Technology Association 2009 Annual Conference & Exposition. Austin, TX. July 13, 2009.
- Feasibility of Artificial Recharge in the Vicinity of Baldwin Lake, Big Bear Valley, California. California State University, Los Angeles. Master’s Thesis. March 2006.