

James Beach is a Professional Geoscientist in Texas with 30 years' experience in professional consulting in groundwater and surface water hydrology, water resources development and planning, groundwater well field design and development, permitting, environmental assessments, numerical flow and solute transport modeling, quantitative contamination evaluations, litigation support, and expert witness work. James has been successful in business leadership and operations, cost center management (P/L), business development and client management, corporate and project risk management, and employee development and management.

Mr. Beach has always maintained significant involvement with clients, projects, and technical work, and has developed trusted advisor status with many clients and in the industry. James stays active in water related professional organizations to support industry advancement and maintain visibility among clients and colleagues. He is currently serving as a Board member for the Texas Water Conservation Association and is a member of the Groundwater panel as well. Mr. Beach has consulted for municipal, industrial, private and government clients, and has served as technical consultant for state regulatory agencies and groundwater conservation districts.

Mr. Beach has worked on regional planning efforts in eight of the sixteen regional planning areas of Texas. He has also worked on projects around the US and abroad. His expertise in quantitative hydrogeology includes experience in assessment of groundwater availability and quality in many aquifer systems; evaluation of current and projected water supply and demand; identification of critical groundwater areas and long-term availability; groundwater/surface water interaction; groundwater model development, use and interpretation; GIS applications and mapping; development of water-management strategies; well field design (vertical and horizontal); public/regulatory interaction, and report preparation. He has experience in litigation support ranging from groundwater rights/permitting (in different cases supporting regulators, permittees, or third parties), groundwater use and valuation disputes, environmental damage claims, oil/gas permitting, and other hydrologic issues.

James has significant experience in application of numerical models to evaluate water resources as well as contaminant flow and transport in the subsurface. He has experience characterizing, evaluating, and modeling flow and contaminant movement in unsaturated and saturated subsurface environments including deep vadose zone systems. He has evaluated deep-well injection, natural and enhanced bioremediation, landfill covers, slurry/sheet pile walls, and injection/recovery systems. He has worked at sites with contamination from free and dissolved phases of light and dense nonaqueous liquids (LNAPL and DNAPL), radionuclides, inorganic species and metals. Environmental projects include technical consulting for commercial, industrial and government clients to meet regulatory mandates as well as assisting regulatory agencies in technical issues of evaluating compliance at permitted facilities.

## **EDUCATION/TRAINING/CERTIFICATIONS**

M.S. in Hydrology, New Mexico Institute of Mining and Technology, 1989

B.S. in Hydrology, Tarleton State University, 1987

Professional Geoscientist #2965, State of Texas

National Ground Water Association

Texas Water Conservation Association

Texas Groundwater Association

Texas Alliance of Groundwater Districts

29 CFR 1910 40-Hour Health and Safety Training

## **SUMMARY OF PROFESSIONAL EXPERIENCE**

Jan. 2021 – Present: Advanced Groundwater Solutions LLC, Founding Principal, Austin, Texas  
2017 – Jan. 2021: VP and Water and Environment Texas Area Manager, WSP USA, Austin, Texas  
2012 -2017: Sr. Vice President, Shareholder and Board Member, LBG-Guyton Associates, Austin, Texas  
2009 - 2011: Vice President and Shareholder, LBG-Guyton Associates, Austin, Texas  
2002 - 2008: Senior Associate with LBG-Guyton Associates, Austin, Texas  
1999 - 2001: Senior Hydrologist with LBG-Guyton Associates, Austin, Texas  
1992 - 1999: Groundwater Hydrologist, INTERA, Austin, Texas  
1989 - 1992: Groundwater Hydrologist with McCulley, Frick & Gillman, Inc., Austin, Texas  
1984: Assistant Well Driller with Magill Well Service, Eden, Texas

## **PROJECT EXPERIENCE**

### ***Consulting Hydrogeologist – multiple Groundwater Conservation Districts***

Over the past 20 years, James has served as consulting groundwater hydrologist in an ongoing capacity or on a project basis for many districts, including Red River, Prairielands, Middle Trinity, Clearwater, Lone Star, North Texas, Bandera, Trinity Glen Rose, Headwaters, Hill Country, Lipan-Kickapoo, Reeves, Brazos Valley, Harris-Galveston Subsidence, and others. Support has included development of management plans; designing groundwater monitoring networks; assessing DFCs/MAGs for joint groundwater planning; groundwater availability model runs; assessing impacts of potential rules; review of studies regarding impact from fracking; assessing strategies in state water plan and future groundwater pumping; assessing ASR and brackish groundwater, recharge, stream-aquifer interaction, water budgets, and long-term sustainability; developing rules and policies; development of well spacing rules and interactive tools to assess well spacing; evaluating permits and impacts of proposed production.

### ***Evaluation of Groundwater Availability in Texas***

Completed fundamental hydrogeologic research in almost every major and minor aquifer in Texas. Developed new GAMs or modified/used existing TWDB GAMs to develop groundwater availability estimates and long-term impacts from current and proposed groundwater usage. Projects included estimation of recharge, pumping distribution, estimation of exempt pumping, model development and calibration, as well as developing appropriate predictive scenarios. Clients have included the private landowners, industry, TWDB, developers, and groundwater conservation districts. Objectives vary from evaluating groundwater availability, estimating impact of new production, helping develop Desired Future Conditions, developing adequate monitoring plans, addressing permit issues, and developing management approaches for water users and districts.

### ***San Antonio Water System***

- Interaction with groundwater conservation districts/GMAs and evaluation of DFCs/MAGs
- Permitting of Gonzales Carrizo wells
- Carrizo ASR groundwater model development and use
- Use of EAA MODFLOW model to optimize Carrizo ASR injection
- Hydrogeologic characterization of potential brackish groundwater projects
- Planning and implementation of SAWS brackish Wilcox project
- Modeling and permitting of SAWS Injection wells
- Model develop for northern Bexar County Trinity groundwater model
- Evaluation of Bexar Met wells in Trinity Aquifer and Carrizo Aquifers
- Assessment and modeling of potential Local Carrizo wellfield
- Support for well design and construction services

### ***Development of T-Bar Wellfield – Midland County Freshwater Supply District***

Project included providing hydrogeologic field support during test hole drilling, sample collection, hydrogeologic assessment, evaluation of screen intervals and well designs, wellfield layout, water quality assessment, and model development to assess long-term production.

***Evaluation of Groundwater Availability in the Carrizo-Wilcox Aquifer***

Used existing MODFLOW groundwater flow model in northeast and central Texas to develop availability estimates and to determine the long-term impacts from projected groundwater demand. Evaluation helped identify potentially critical areas and aided in the development of a set of wells throughout the region to help assess future water-level changes.

***El Paso Water Utilities Integrated Water Management Plan***

PM to develop and update El Paso Water Utilities Integrated Water Management Plan consistent with the State Water Plan. Project tasks included working closely with EPW staff to evaluate conservation approaches, water demand and availability projections, political and regulatory considerations, and ultimate selection and costing of appropriate strategies to meet demands from multiple sources.

***Development of Igneous-Bolson Aquifer Groundwater Availability Model***

Served as project manager and primary modeler to develop a 3-layer MODFLOW model to simulate groundwater flow in the west Texas Bolson and Igneous aquifers. All model data was developed and evaluated within ArcGIS and was compatible/interchangeable with the modeling GUI. Model development and calibration included assimilation of historical pumping and water level data, as well as aquifer characteristics. Aquifer water levels and streamflow data were used to calibrate and verify the steady state and transient models. Predictive simulations, which incorporated 50-year demand projections and potential drought conditions, were used to assess aquifer impact and groundwater availability.

***Lipan Aquifer Groundwater Availability Model, Texas***

Collected and evaluated available hydrogeologic data from groundwater district and state databases. Developed a two-layer MODFLOW model to simulate groundwater availability from the upper alluvial aquifer and the lower Permian limestone aquifer. All model data was developed and evaluated within ArcView GIS and was completely compatible and interchangeable with the modeling GUI. Steady state and transient calibration were completed and the model was verified with the most recent “heavy-use” water level trends and irrigation usage. The model incorporated stream-aquifer interaction as well as spatially and temporally varying recharge and pumping.

***Assessment of Brackish Groundwater for Desalination in Texas***

Managed project for the Texas Water Development Board to assess the potential for desalination of brackish groundwater in Texas' major and minor aquifers. The study included evaluation of water-quality and geophysical data for over 30 aquifer systems throughout the state and development of hydrogeologic and water-quality maps that can be used to assess potential brackish water projects for planning purposes. The evaluation also included preliminary cost estimation formulas for source water production (wells and well fields) and engineering considerations for different aquifers.

***Carrizo-Wilcox Wellfield Permits***

Completed modeling using the TWDB Queen City/Sparta-Carrizo-Wilcox MODFLOW GAM to develop appropriate permitting strategies. Modeling included the use of specialized code to simulate pumpage reduction based on water level declines as specified in groundwater conservation district rules.

***Assessment and Development of Clear Water Wellfield – Midland County Freshwater Supply District***

Completed a preliminary hydrogeologic assessment of Pecos Valley and Dockum Aquifers on the property, test hole program design, assessment of test hole data, pumping tests and water quality, developed groundwater model to assess long-term groundwater availability.

***Midland County Water Plan – Midland County***

Assessed county demands from several water user groups, completed a hydrogeologic assessment of current and potential groundwater availability, and assessment of multiple aquifers and properties to meet long-term supply.

***Groundwater Availability Modeling, City of Sweetwater, Nolan County, Texas***

PM and modeler for evaluation of groundwater availability in the Dockum in Nolan County, Texas over a 50-year modeling period. Data were gathered on local structure, water levels, aquifer parameters, and current withdrawals to support model calibration and predictive runs for supply to a proposed power plant.

***Brackish Groundwater Injection Well, Bexar County, Texas***

Simulated brine concentrate injection and pressure buildup for a new 4,800-foot concentrate injection well at the SAWS Twin Oaks ASR facility to support TCEQ injection well application.

***Multivariate Analysis, Barton Springs, Texas***

PM for task to use multivariate statistical analysis of springflow, precipitation, streamflow, and groundwater levels in support of drought management and triggering methodology for Barton Springs/Edwards Aquifer Conservation District. Barton Springs flow was statistically modeled with multiple linear regression techniques.

***Industrial Groundwater Availability Study, Andrews and Gaines Counties, Texas***

PM on annual groundwater availability study from the Ogallala Aquifer in Andrews and Gaines Counties, Texas within the water rights areas of a water supply corporation. The annual study update involves gathering and evaluating water level and pumping information from wellfields in the two counties. This data is compared to predictive model results completed in the first phase of the project, and model was recalibrated as necessary on an annual basis to incorporate the effects of new wells within and outside the water rights areas.

***Recharge and Recovery of Reclaimed Wastewater, City of Austin, Texas***

PM and modeler for preliminary assessment of managed aquifer recharge for reclaimed wastewater. Project included assessment of potential sites for infiltration basins, core sampling and testing, infiltration assessment, groundwater modeling, conceptual horizontal well design for shallow river alluvium, assessment of groundwater movement and recovery efficiency. Evaluated the optimum size of infiltration basins and production wells to minimize cost and maximize recovery.

***Nacatoch and Blossom Aquifers Brackish Studies to Assess Brackish Production Zones for TWDB***

Managed two projects aimed at determining potential brackish groundwater production zones in the downdip slightly and moderately saline zones. Salinity estimates were derived from the evaluation of geophysical logs to determine the down-dip extent of the 10,000 mg/L TDS boundary and calibrated with water sample data. Brackish groundwater production zones were evaluated using various pumping scenarios to determine potential impacts to the nearby users. Additionally, in-place groundwater volume calculations were completed for each salinity zone. The stratigraphic, lithologic, and hydrochemical data generated from these projects will be added into TWDB's Brackish Resources Aquifer Characterization System (BRACS) database.

***Assessment of Aquifer Storage and Recovery – City of College Station, Texas***

Completed a preliminary hydrogeologic assessment of ASR for the city, including assessing hydraulic properties, water quality, operational efficiencies, wellfield layout, and impacts of natural gradients. A multi-well model allowed evaluation of a conceptual ASR system injecting 6 MGD.

***Aquifer Characterization and Wellfield Assessment - City of Borger***

Project included assessment of existing data, geophysical assessment, hydrogeologic field support during testhole drilling, sample collection, hydrogeologic assessment, wellfield layout, and groundwater model development.

***Characterization and Modeling of ASR System – San Antonio Water System***

Updated and recalibrated SAWS ASR groundwater model to evaluate 10 years of injection/extraction, movement and mixing of native and injected waters, water quality, percentage of system recovery and loss, total aquifer storage capabilities, losses to competitive pumping, maximum production and injection rates. The model predicted movement of injected water, impact from nearby production, and water quality of blended water upon extraction.

***Horizontal Well Assessment, Planning and Permitting – West Texas***

Xcel Power had limited production from vertical wells (40 gpm) in the Ogallala aquifer with relatively small saturated thickness, which was the catalyst for the horizontal well feasibility study. A groundwater model was developed to assess economic feasibility of horizontal wells and to support permitting. Surface geophysical surveys and test borings were completed to optimize the location of the horizontal well. Worked with the drilling contractor to develop innovative well screen and development approach to complete a highly productive well (1000 gpm).

***Development Gulf Coast Groundwater Model of Catahoula Aquifer***

Worked with the Lone Star GCD to develop a MODFLOW groundwater models to simulate groundwater flow and pumping impacts in the Catahoula Aquifer. The model was based on hydrogeologic characterization using geophysical logs and limited number of deep production wells.

***Presidio County, Texas***

Evaluated structural and hydrogeologic data for the area surrounding the Shafter Mining District for groundwater model. Provided quantitative hydrogeologic opinions for mining company to explain groundwater flow and potential impacts from dewatering.

***Update and Recalibration of Groundwater Model for Reno, Nevada***

Converted a complex, non-standard model to MODFLOW. The model implemented domestic and municipal pumping; distribution system leakage; recharge from mountain-fronts, precipitation, and irrigation; evapotranspiration; rivers and streams; and discharge from springs and man-made pits. The model will be used to complete wellhead protection assessment and evaluate long-term effects of multiple production scenarios. Data was developed within ArcGIS and interchanged with groundwater model.

***Confidential Client – Reeves County***

PM to assess productivity of Capitan Reef Complex aquifer. Reviewed existing stratigraphic and hydrogeological information on wells near the Site, and developed a groundwater model to assess groundwater production capacity, and long-term groundwater availability.

***Expanded Brackish Desalination Well Field – Wilson County***

Worked with hydrogeologic team to assess brackish groundwater availability. Used a modified TWDB GAM, simulated groundwater production, DFC impact, permitting issues and aquifer impacts from expanded SAWS brackish wellfield in Wilson County. Evaluated wellfield locations, impact on existing brackish wellfield, and other design issues.

***Trinity Glen Rose Groundwater Conservation District***

Served as consulting hydrogeologist for over 14 years, completing multiple studies related to groundwater recharge, update of stratigraphic maps, groundwater modeling to assess permit issues and DFCs, and other groundwater issues.

***Evaluation of Hydrochemical and Isotopic Data in Groundwater Management Areas 11, 12 and 13***

PM for TWDB study to assess water quality of the Carrizo-Wilcox Aquifer in Texas. The team compiled well data, geophysical logs, completed geochemical transect wells, determined stratigraphic formation tops and constructed strike and dip transects through three separate areas. The transects were the foundation for the geochemical modeling evaluation to determine change in geochemical signatures as water migrated along the transect.

***Desired Future Conditions Explanatory Report for GMA 9***

Provided hydrogeologic and groundwater technical consulting to help prepare technical content for the report including: general aquifer descriptions and maps of major and minor aquifers within the GMA, technical sections and maps for the portions of aquifers and counties designated non-relevant. Lead public presentations and discussions regarding groundwater modeling, hydrogeologic issues, and impact of DFCs on the nine factors including: aquifer uses and conditions, hydrologic conditions and DFC feasibility.

***Consulting and Modeling Support for GMA 8***

Worked with multiple groundwater districts to assess future pumping projects, potential demands, regional water strategies, and management goals to develop appropriate modeling scenarios and results to guide decision makers in selecting DFCs. Project led to a follow-up contract to serve as technical consultant to GMA 8 to complete the Explanatory Report.

***Evaluation of New Groundwater Sources, City of Crane, Texas***

Evaluation of the availability of groundwater in the Edwards-Trinity Plateau, Pecos Valley Alluvium, and Dockum aquifers for the City of Crane to identify potentially viable supplies at a reasonable cost. Data were gathered on local hydrogeology, well capacity, water levels, aquifer parameters, water quality and current withdrawals to support preliminary recommendations for further assessment.

***Aquifer Storage and Recovery of Reclaimed Wastewater – City of Austin***

Preliminary assessment included evaluation of potential sites for infiltration basins, core sampling and testing, infiltration assessment, groundwater modeling, conceptual horizontal well design for shallow river alluvium, assessment of groundwater movement and recovery efficiency, and cost estimates. Optimized the size of infiltration basins and production wells to minimize cost and maximize recovery.

***150-Mile Radius Groundwater Supply Ranking – Central-West Texas***

Worked with confidential client to evaluate and rank potential groundwater projects to meet future water needs. Ranked projects based on estimated well field capacity, volume of groundwater, infrastructure costs, permitting issues, sustainability, water quality, and other factors.

***Groundwater Resource Planning/Assessment – City of San Angelo***

Mr. Beach has worked with the City of San Angelo for over 15 years on projects related to groundwater availability, brackish groundwater studies, potential groundwater projects, Hickory wellfield modeling and regulatory support, and other water resource evaluations.

***Texas Regional Water Planning – (TWDB Regions A, D, E, F, H, I, J, M, N)***

Served as general or groundwater consultant on regional planning teams to complete quantification of groundwater resources, evaluation of current and projected water supply and demand, identification of critical groundwater areas, development of water management strategies, development of a water supply plan, use of TWDB GAMs to assess groundwater availability, public interaction and presentations, and report preparation. Working with the RWPGs in these projects helped to identify regional groundwater concerns and strategies to meet future demand.

***Joint Groundwater Planning – (Central, East, and West Texas)***

Was integrally involved in the initial round of Joint Groundwater Planning for GMAs across Texas. Worked with groundwater conservation districts, municipalities, industrial users, irrigators, and other stakeholders to navigate through the process of setting DFCs in several GMAs in Texas. Specific tasks included assessing the hydrogeologic reasoning for DFCs, utilizing GAMs and other models to simulate the impact of DFCs, and providing alternative approaches for developing DFCs. Worked for various clients in eleven of the sixteen GMAs.

***Longhorn Pipeline, Austin, Texas***

Developed and implemented trench testing protocol for Austin-area over environmentally sensitive karst geology. Estimated travel time of overland flow to water bodies, wells, intakes and sensitive features for permitting documents. Developed field supervision protocol for hydrogeologic investigations for pipeline replacement through environmentally sensitive area. Helped develop equipment staging concepts and response time estimates in Hays and Travis County.

***Magellan Longhorn Pipeline***

Helped develop White Paper for Magellan titled “Trench Integrity and Construction Methodology of the Magellan Longhorn Pipeline Mile Post 169.88 to 188.8” to document trench design and the materials and methodologies that were used to prevent material impacts within the Edwards Aquifer Recharge Zone from potential pipeline releases.

***Groundwater Availability and Modeling Evaluation of Trinity Aquifer, Bexar and Comal Counties, Texas***

Developed a MODFLOW groundwater availability model to evaluate the viability of producing Trinity ground water in a portion of the aquifer greatly influenced by surface-water recharge. The model structure was based on site-specific borehole data, and calibrated to a multi-well long-term pump test and was consistent with the TWDB Trinity Aquifer GAM model within the modeled area. The model was used to assess effects of long-term pumping and multiple production scenarios.

***Evaluation of Groundwater Availability for the Gulf Coast Aquifer, Texas***

Utilized existing hydrogeologic evaluations, databases, and ground-water models in east Texas and the Coastal Bend area to develop availability estimates, sustainable yields, and long-term impacts from current and proposed ground-water usage.

***Lower Guadalupe Basin Groundwater Availability Evaluation***

Evaluated groundwater resources for a Lower Guadalupe water supply project. An average of approximately 14,200 ac-ft/year of groundwater was required to supplement the surface-water supply. The study included evaluation of the groundwater availability and quality from the Gulf Coast, Carrizo-Wilcox, Queen City and Sparta aquifers throughout the basin, as well as wellfield evaluation and cost assessment. TWDB groundwater availability models were used to assess groundwater availability, wellfield impact, permitting strategies, and environmental issues.

***Edwards Aquifer Cibolo Transfer Evaluation***

Used the San Antonio Edwards Aquifer MODFLOW GAM to assess the impact of Edwards Aquifer Authority “Cibolo transfers” on springflow from the aquifer. The approach included looking at the effect of transferring pumpage to up-thrown and down-thrown sections of the aquifer, seasonal trends, and the size of the transfers. The specialized MODFLOW Management Module was used to simulate pumpage reductions based on Critical Period/Demand Management regulations.

***Edwards Aquifer Bifurcated Rights Assessment***

Completed modeling using the San Antonio Edwards Aquifer MODFLOW GAM to assess the impact of Edwards Aquifer Authority's proposed bifurcated permitting strategies. Modeling included the use of specialized MODFLOW Management Module to simulate two-tiered pumpage reductions based on proposed trigger levels.

***Hydrologic Modeling of Edwards Aquifer Watershed***

Served as project manager to develop hydrologic models (using HSPF) simulate nine watersheds that contribute recharge to the Edwards Aquifer. The models incorporated available meteorological, hydrological, and geological information to develop estimates of runoff and recharge in the basins for a 50-year period. Water Availability Model (WAM) information was utilized to assess impacts from diversions and flood retardation structures was incorporated. The models are useful for assessing proposed recharge management strategies such as brush control, recharge structures, and precipitation enhancement. In addition, the models can be extended to assess water availability and quality in the basins.

***Groundwater Availability Evaluation of Ogallala Aquifer, Andrews and Gaines Counties, Texas***

Developed a MODFLOW groundwater availability model to predict the viability of producing large amounts of Ogallala groundwater over a 25-year period from two proposed well fields for power generation cooling water. The regional model was calibrated and verified with "pre-development" water levels and with water levels collected over a 50-year period. It accounted for past and future irrigation and municipal usage, incorporated heterogeneity in hydraulic properties, and paleo-channels that greatly influenced the groundwater availability. All model data was developed within ArcView GIS and was completely compatible and interchangeable with the modeling GUI.

***Lignite Mines, Texas***

Performed numerous aquifer tests and analysis, well installations, groundwater sampling, surface water sampling and monitoring. Developed datasets, parameter distributions, and MODFLOW models for mine dewatering/depressurization modeling in central and east Texas lignite mines. Completed baseline groundwater and surface water sampling; drilled and constructed overburden and under burden wells for sampling; developed dewatering/depressurization models.

***Longhorn Pipeline, Central Texas***

Supported the permitting process for the 19-mile pipeline replacement that crossed the Edwards Aquifer recharge and contributing zones. Performed watershed delineation, statistical analysis of streamflow, rainfall-runoff analysis, surface-water flow and transport analysis and risk assessment, overland flow calculations, assessment of detention ponds, and rainfall intensity-duration-frequency analysis. Evaluated shallow geology in 19-mile trench to assess potential for karst recharge to the aquifer. Developed watershed parameters needed to estimate runoff and travel time estimates from the pipeline to surface waterways and karst recharge features, and identified emergency response sites along tributaries. Performed trench percolation tests in karst areas to assess the nature and extent of contamination caused by potential pipeline releases.

***Gas Storage and Transfer Station, Kansas***

Part of a team that developed and implemented a sampling plan to evaluate the source of elevated chloride concentrations in the shallow aquifer system. The evaluation successfully delineated naturally occurring chloride contamination from that portion of a plume that was caused by onsite brine storage ponds.

***Williams Energy Services, Kansas***

Designing and implementing a strategic technical approach to address specific regulatory requirements for developing a monitored natural attenuation (MNA) risk-based methodology for an operating facility.

***Petroleum Refinery, Ohio***

Key player on team to develop and implement a plan to evaluate ROST™, soil sampling, and partitioning interwell tracer tests as a means of effectively and economically characterizing site. Involved in design, field implementation, and analysis of all three techniques.

***Mine Ash Disposal Facility, East Texas***

Completed geophysical and hydrogeologic assessment to characterize lithification of ash deposits to determine best approach for removal prior to pit construction through the area.

***Rare Earths Mine, West Texas***

Completed groundwater assessment of four potential sources of for mine construction and milling supply of up to 6,000 acre-feet/yr.

***Silver Mine, West Texas***

Assessment of impact from shaft dewatering on surrounding wells and springs.

***Surface Lignite Mine, Rockdale, Texas***

Developed and implemented an aquifer testing program to support dewatering evaluations. The fieldwork included well installation and development, as well as aquifer testing. Quantitative evaluation of aquifer test data was also completed.

***Chemical Waste Landfill, Sandia National Laboratories, Albuquerque, New Mexico***

Aided in the development and implementation of a state-of-the-art vadose zone tracer test to characterize the quantity and location of dense nonaqueous phase liquids in the unsaturated zone below abandoned waste units.

***Rendering Plant, San Angelo, Texas***

Performed field investigation to determine extent of contamination at a site contaminated with diesel fuel after years of surface spills. Investigation entailed collection of soil samples, installation of monitoring wells, well development, groundwater sampling, and hydraulic testing. Also included preparation of a remedial action plan.

***Uncompahgre River, Colorado***

Analyses and interpretation of seasonal water quality data from an extensive mountain stream network feeding the river to delineate the source of and possible remedial strategies for heavy metal loading from abandoned mine portals, which was the cause of diminished local fish populations.

***Rare Earths Processing Facility, West Chicago, Illinois***

Worked with regulatory authorities to scrutinize proposed soil and groundwater reclamation proposals from the responsible party. This process entailed development of intricate database programs to characterize and verify existing contamination as well as proposed excavation plans. In addition, a complete statistical analysis was completed to determine background groundwater concentrations and applicable groundwater protection standards that satisfied multiple regulatory authorities and requirements.

***Comanche Peak Steam Electric Station, Glen Rose, Texas***

Quarterly sampling and evaluation of groundwater data from Class I RCRA landfills. Also aided in the preparation of a work plan for clean closure of one landfill that was in direct hydraulic connection with the cooling lake; this plan was accepted and the landfill was later closed.

***Kenai Peninsula, Alaska***

Developed a three-dimensional groundwater flow model of a complex faulted glacial geological system below a petroleum refinery that was contaminated with light nonaqueous-phase liquids. The calibrated groundwater model was used to evaluate the effectiveness of various control and containment scenarios, including implementation of extraction/injection wells and sheet-pile walls. Estimated the total quantity of LNAPL in the aquifer based on the measured thickness in contaminated wells.

***Refinery Complex, Texas Gulf Coast***

Led technical team to develop appropriate site conceptual model and a three-dimensional flow and transport model (2.1 million grid blocks) to statistically evaluate alleged groundwater contamination by petroleum hydrocarbons in a heterogeneous aquifer. State-of-the-art geostatistical and stochastic modeling tools were utilized to complete the analysis; visualization/animation techniques were used to effectively illustrate model results.

***Basin Flow Model, Paris, France***

Was lead modeler and project manager for a project that developed a regional model which incorporated five hydrogeologic units into a 12-layer flow model to support performance assessment for a proposed radioactive waste repository. The model also incorporated stream-aquifer interaction and evaluated potential variability under future climate and water demands. Adjoint-sensitivity analysis was also performed to address the model's sensitivity and to identify the most critical data needs.

***Columbus Air Force Base, Mississippi***

Calibrated and verified a two-dimensional transient flow and transport model (Bioplume II) to evaluate natural attenuation of dissolved phase jet fuel components (benzene, dichlorobenzene, naphthalene, p-xylene) and tritium in a shallow alluvial aquifer. Site characterization data and historical plume monitoring data was used to develop a reliable site model to predict down gradient concentrations at the site. Aerobic and anaerobic biodegradation as well as nondestructive natural attenuation mechanisms were incorporated to evaluate the fate of the plume.

***A/M Area Disposal Sites, Savannah River Site, South Carolina***

Developed a three-dimensional transient model to evaluate the potential movement of dissolved phase solvents (TCE, PCE, TCA, etc) in the saturated zone in the forty years since disposal started. This model was used to evaluate the effectiveness of the current pump-and-treat recovery system and evaluate future movement of the dissolved phase plumes.

***F&H Area, Savannah River Site, South Carolina***

Managed the development of numerical models to evaluate capture and containment effectiveness. Developed appropriate monitoring strategy to verify hydraulic containment, developed a strategy for rehabilitating injection wells, and aided in developing a geochemical plan for pump-and-treat containment and recirculation system.

***DOE WIPP Facility, Carlsbad, New Mexico***

Applied the SWIFT-II flow and transport code to evaluate the effectiveness of the proposed upper-shaft short-term seal design. Applied a unique and efficient approach to incorporate the cylindrical system of seal components into a two-dimensional model and implemented a new linear boundary condition to mimic flow from the lower boundary. The model was used to identify those components that were most critical to preventing fluid flow from the upper-shaft region to the repository level.

***Aluminum Processing Facility, Missouri***

Used site characterization data to conceptualize and develop a coupled soil and groundwater model to evaluate the fate and transport of a PCB compound. Model evaluations included estimating groundwater contamination downgradient from the site in an aquifer discharging to a major river. Developed parameters to estimate risk to human health and the environment at the river due to the PCB release.

***Sanitary Landfill, Savannah River Site, South Carolina***

Developed an aerial flow model and a vertical cross-section contaminant transport model to support risk assessment calculations and support an alternative concentration limit (ACL) demonstration for the facility. The areal flow model was used to evaluate the effectiveness of capping in decrease point-of-compliance (POC) concentrations and the transport model was used to estimate POC and point-of-exposure (POE) concentrations.

***Hazardous Waste Disposal Facility, Kern County, California***

Applied a variably saturated flow model (UNSAT2) to evaluate and recommend the proper distance between neutron probe access tubes that were used to monitor leakage from the waste management units to the extensive vadose zone below the facility.

***Deep Well Injection Facility, Southeast Texas***

Developed a SWIFT-II transport model to demonstrate no migration under EPA regulations.

***Bunker Hill Superfund Site, Smelterville Flats Area, Idaho***

Using MODFLOW, developed a saturated groundwater flow model to evaluate/design fluid residence times and travel paths through a constructed wetland. The groundwater was contaminated with heavy metals and the constructed wetlands were designed to maintain a reducing environment for metals precipitation. The USGS code MODPATH was used to perform particle tracking through the wetlands area.

***DOE WIPP Facility, Carlsbad, New Mexico***

Applied the SWIFT-II flow and transport model to investigate the transient pressure response of slanted well bores with the very low conductivity halite zones of the Salado Formation. This evaluation was performed to determine the effects of well bore slant on the results of permeability testing interpretations.

***COL Application for Proposed New Nuclear Power Plants***

Mr. Beach assisted the Subject Matter Experts (SMEs) in the development of a quantitative groundwater model for the Combined Operating License (COL) application, Final Safety Analysis Report (FSAR) for a two-new reactor site. The groundwater codes used in the assessment were MODFLOW, MODPATH, and RESRAD. Mr. Beach is also serving as a technical advisor and participant in discussions with the SMEs and the Nuclear Regulatory Agency (NRC) for the hydrogeological models.

***Lead Smelting and Battery Manufacturing Facility, Columbus, Georgia***

Used SWIFT-II to develop a flow and transport model for the site in order to design an effective/efficient groundwater extraction system for a dissolved phase solvent plume.

***Mine Disposal Facility, Minnesota***

Developed a numerical flow model using MODFLOW to determine the effectiveness of slurry walls or sheet pile to divert groundwater flow around a semi-wetland area that contained waste disposal units. The model was also used to evaluate the effectiveness of capping the waste disposal units to minimize leachate production.

***Illinois Department of Nuclear Safety, Springfield, ILL***

Assisted in the preparation of environmental analyses for each decommissioning phase of a closed thorium and rare earths facility for the Illinois Department of Nuclear Safety. Each environmental assessment included: (1) an assessment of the radiological and nonradiological impacts to the public health from the activities proposed by the applicant; and (2) an assessment of impacts on any waterway and groundwater resulting from previous activities and activities proposed by the applicant. The assessment also included the consideration of remedial alternatives proposed by the applicant and consideration of the long-term impacts of the decontamination and reclamation activities proposed by the applicant.

**LITIGATION SUPPORT**

***2019-current – Two confidential cases underway.***

Both cases involve groundwater permitting issues.

***Private Landowner, West Texas (2018)***

Characterized aquifer conditions and groundwater use by operators. Case settled in favor of client with substantial settlement.

***District Court, Water Division No. 1, State of Colorado (2017)***

Evaluation of Groundwater Return Flows for Mayer Farm (Case No. 09CW091)

***Permit Hearing, Railroad Commission of Texas (2017)***

Provided technical analysis and testimony regarding hydrogeologic conditions, groundwater flow, and onsite/offsite monitoring plans related to permitting of enhanced oil recovery project in Texas Gulf Coast region.

***Contested Case Permit Hearings, Bandera Texas (2016)***

Testifying expert in contested case hearing before groundwater conservation district and State Office of Administrative Hearings regarding impact of proposed well permits on existing wells and long-term impacts.

***Groundwater Rights, Bastrop Texas (2016)***

Testifying expert in contested case hearing before groundwater conservation district and State Office of Administrative Hearings. Testified on the impact of proposed well permits on production capacity of client's existing wells and long-term impacts on ability to provide water as required by CCN. Also involved in development of mitigation plan and negotiations for settlement between parties.

***Groundwater Rights, Bastrop Texas (2015)***

Testifying expert in contested case hearing before groundwater conservation district and State Office of Administrative Hearings.

***Groundwater Rights and Export Permit Application, Fort Stockton Texas (2013)***

Served as hydrogeologic expert in a contested case hearing for landowner before Middle Pecos GCD regarding proposed production permits. Developed groundwater availability model used for testimony in the case.

***Technical Support for Railroad Commission of Texas Permitting***

Provided technical analysis and regulatory interaction regarding Area of Review variance request. Analysis involved evaluation of hydrogeology, assessment of USDW, and groundwater conditions. Commission granted a variance to AoR requirements.

***Industrial Complex - Albuquerque, New Mexico***

Supported the defendant's legal team in evaluating the plaintiff's expert opinions regarding source of contamination and extent of contamination for various organic contaminants. Assessed plaintiff's groundwater flow and transport model, which was used as the basis for many of the plaintiff's conclusions. Critiqued weaknesses of the three-dimensional flow and transport model and completed additional simulations using plaintiff's model to assess the

sensitivity of model results to aquifer parameters (such as biodegradation and sorption). Visualization and animation techniques were utilized to summarize model results.

***Ogallala Aquifer Groundwater Permit Hearings, Roberts County, Texas –***

Supported a legal team in their assessment of impacts from proposed groundwater permit applications to the Panhandle Groundwater Conservation District. A groundwater model was used to simulate the impact of pumping on surrounding properties and to evaluate the rate of water level decline with respect to District guidelines.

***Refinery Complex, Texas Gulf Coast***

Led technical team to develop appropriate site conceptual model and a three-dimensional flow and transport model to statistically evaluate alleged groundwater contamination by petroleum hydrocarbons in a heterogeneous aquifer. State-of-the-art geostatistical and stochastic modeling tools were utilized to complete the analysis; visualization/animation techniques were used to effectively illustrate model results.

***Injection Well Facility, Texas***

Evaluated hydrogeology and contaminant information obtained from previous site investigations to develop an appropriate conceptual model of groundwater flow at the site. Interviews of operators, aerial photography, flow and transport modeling, quantitative subsurface volumetric analysis, and visualization techniques were all used to reconstruct activities and events that were probable contaminant contributors. The results were used to apportion responsibility and remediation costs among potentially responsible parties.

***Manufacturing Facility, Canada***

Worked with technical team to develop a three-dimensional flow and transport model to evaluate groundwater contaminant transport of chlorinated solvents in a complex system. Visualization and animation techniques were utilized to distill and present model results. Results were part of a successful strategy to negotiate a pre-trial settlement.

***Manufacturing Facility, Texas***

Evaluated available site data (boring logs, water levels, contaminant concentrations, river levels, etc.) to develop an appropriate conceptual representation of flow and transport from the facility to down gradient properties. Results were part of a successful strategy to illustrate the weakness of the plaintiff's allegations during court proceedings.

***Landfill, Texas***

Evaluated the potential for groundwater contamination from landfill leakage. Scoping-level evaluations indicated that potential plaintiffs were far enough downgradient that the potential for impact from the landfill was very low. The evaluation included assessment of natural attenuation mechanisms (biodegradation, dispersion, dilution, etc.) of PCE and TCE.

***Industrial Complex, Texas***

Led in the development of a three-dimensional flow and transport model to evaluate groundwater contamination by chlorinated solvents that were disposed of over a 30-year period.

***Surface-Water Rights, Texas***

Served as a technical expert to assess surface-water dispute. As part of the investigation, surface-water flows in the disputed waterway were measured and losses due to evaporation and aquifer interaction were evaluated. Results of the field investigation helped set the stage for a pre-trial resolution between parties.

## **James A. Beach, P.G.**

### **PUBLICATIONS AND PRESENTATIONS**

Beach, J. A., 2019. Invited panel discussion stream-aquifer interaction. Texas Groundwater Summit hosted by the Texas Alliance of Groundwater Districts, August 2019.

Beach, J. A., 2017. Invited panel discussion on DFC implementation and monitoring. Texas Groundwater Summit hosted by the Texas Alliance of Groundwater Districts, August 31, 2017.

Beach, J. A., D. Bardsley, and T. Davidson. Siting, Design and Construction of High Capacity Horizontal Well for Industrial Use in the Ogallala Aquifer. Texas Water Conservation Association, October 2017.

Beach, J. A., 2017. Finding the Balance Between Highest Practicable Groundwater Production and Conservation in Groundwater Availability in Texas as part of Session: Rule of Capture and Sustainable to Consensus Yield. Geological Society of America, South-Central Section, San Antonio Texas, March 13, 2017.

Beach, J. A., 2016. Understanding the Geology of Aquifers for Aquifer Storage and Recovery. 16th Annual Bell County Water Symposium, November 16, 2016.

Beach, J. A., 2016. Desired Future Conditions – Will Process Changes Increase Accountability? Presented at Texas Water Law Institute – 2016 Water Law Fundamentals, November 4, 2016

Beach, J. A., 2016. Panelist for Session: Moving Groundwater in Texas. Texas Groundwater Summit hosted by the Texas Alliance of Groundwater Districts, August 23, 2016.

Beach, J. A., 2015. Texas' Billion Dollar Desired Future Condition (DFC) Balance – Conservation versus Highest Practicable Production. Presented at Texas Aquifers Conference, June 26, 2015.

Beach, J. A., 2014. Brackish Groundwater and Desired Future Conditions (DFCs) – Intersection of Science and Policy. Texas Groundwater Summit hosted by the Texas Alliance of Groundwater Districts, August 27, 2014.

Beach, J. A., Groundwater Science. Presented to the Texas Alliance of Groundwater Districts at the Texas Groundwater Summit, August 26, 2014.

Beach, J. A., K. Morrison, and S. Reinert, 2014. Digging Deeper for a Reliable Water Supply. Water Efficiency: The Journal for Water Resource Management. November/December 2014.

Beach, J. A., 2014. Aquifer Storage and Recovery. Presented at Water Awareness Summit in Rio Grande Valley, December 5, 2014.

Beach, J. A., 2014. Panel Moderator: Investment Perspectives and Presenter: Developing Brackish Water Aquifers to Create a Fresh Water Source. Lone Star State Water Summit, June 24, 2014.

Beach, J. A., 2014. Texas Growth and Drought – Revisiting Conjunctive Use and the Value of Wet Water. Presented at Texas Aquifers Conference, June 2, 2014.

Beach, J. A., 2014. Panelist for Session: Brackish Groundwater and Desalination. Presented at 15th Annual Changing Face of Water Rights Course hosted by Texas Bar CLE, February 27, 2014.

Beach, J. A., The Changing Face of Texas Water Rights. Invited Presentation to the Texas Bar CLE, February 26, 2014.

Beach, J. A., 2013. Developing Brackish Water Aquifers to Create a Fresh Water Source. Lone Star State Water Summit, November 15, 2013.

Beach, J. A., 2013. Regional Livability Symposium: Water – Key to Our Future. Envision Central Texas. February 15, 2013.

Beach, J. A., 2012. Groundwater 101 as part of ABCs of GCDs. Texas Groundwater Summit hosted by the Texas Alliance of Groundwater Districts, August 28, 2012.

## **James A. Beach, P.G.**

Beach, J. A., 2012. Growth and Groundwater in Texas: What Are We Learning. Texas Water Conservation Association, June 15, 2012.

Beach, J. A., 2010. Modeling that Leads to Decision Limitations: How Do You Attack It? Presented at 11th Annual Changing Face of Water Rights Course hosted by Texas Bar CLE, March 25, 2010.

Beach, J. A., 2006. Groundwater in Texas: It's Availability and Management: GAMs, GMAs, DFCs, and MAGs. Presented at Water Rights and Sales and Transfers in Texas. December 15, 2006

Beach, J. A., C. W. Kreitler, and W. B. Klemm, 2002. Brackish Water Resources of the Gulf Coast Aquifers in Texas. To be presented at Gulf Coast Association of Geological Societies Symposium, Austin Texas, October 2002.

Beach, J.A., and A. Standen, 2000. Ground-Water Availability Model of the Lipan Aquifer. Presented at the Southwest Focus Ground Water Conference sponsored by the National Ground Water Association in May 17-18, 2000; Austin, Texas.

Beach, J.A., and G. Ruskauff, 2000. Practical Aspects of Conceptualization and Modeling of Heterogeneous Deltaic Deposits. Presented at the Society of Sedimentary Geology (SEPM)/ International Association of Sedimentologists (IAS) Conference on Environmental Sedimentology: Hydrogeology of Sedimentary Aquifers, September 24-27, 2000; Santa Fe, New Mexico.

Beach, J. A. and C. Kreitler, 1999. Availability of Ground Water from the Ogallala Aquifer in Gaines and Andrews County. Confidential Client.

Fryar, D.G., J.A. Beach, V.A. Kelley, M.K. Knowles, 1997. Long-Term Brine Migration Through an Engineered Shaft Seal System, Proceedings of the ASCE Fourth Congress on Computing in Civil Engineering, 1997

Beach, J.A., 1996. Modeling Natural Attenuation of Organic Contaminants Using the Bioplume II Transport Model. Invited Presentation to Regional EPA Conference, Albuquerque, New Mexico, September 1996.

Beach, J.A., D. G. Fryar, H.S. Rifai, K. Appling and T.B. Stauffer, 1996. Simulation of Natural Attenuation of Organic Tracers at the MADE Site Using the Bioplume II Transport Model. In: Calibration and Reliability in Groundwater Modeling, Proceedings of the ModelCARE'96 Conference held at Golden, Colorado, September, IAHS Publication No. 237.

Close, Bence V., Bryan L. McCulley, and J.A. Beach, 1990. Assessment of Ground-Water and Vadose Zone Monitoring System Requirements in an Arid Environment, In: Proceedings of the Thirteenth Annual Madison Waste Conference, September.

Beach, J.A., D.B. Stephens, and A.L. Gutjahr, 1989. Incorporation of Spatial Variability in Mill Tailings Hydraulic Properties into Numerical Models: Implications for Uncertainty in Seepage Prediction and Groundwater Protection, In: Proceedings of the Ninth Annual AGU Front Range Branch Hydrology Days, April.