T. Neil Blandford, P.G.

Senior Vice President, Principal Hydrologist

EDUCATION

M.S., Hydrology,
New Mexico Institute of Mining and Technology, 1987

B.A., Environmental Science,
University of Virginia, 1984

PROFESSIONAL REGISTRATIONS

Professional Geoscientist,
Texas, No. 1034

Mr. Blandford specializes in water supply investigations and water rights analysis, groundwater planning studies, numerical simulation of groundwater flow and contaminant transport, hydrogeologic evaluations at mine sites, aquifer testing methods, effects of groundwater pumping on surface water, wellhead protection area delineation and source water determination, remediation well field design, and expert testimony.

Blaine Aquifer System Brackish Groundwater Analysis, Texas Water Development Board, North-Central Texas
Project manager for the assessment and evlaution of the fresh and brackish groundwater resources of the Blaine Aquifer system in north-central Texas. The aquifer system encompasses a region of about 10,000 square miles and is the sole source of supply for numerous communities, agriculture and local industry. Project involved geologic and hydrogeologic mapping of aquifer units and production intervals, determination of groundwater quality, evalaution of the effects of potential well fields, and interaction with stakeholders.

Evaluation of Groundwater Modeling for Santee Basin Groundwater Recharge and Replenishment Project, Padre Dam Municipal Water District, Santee, California
Principal investigator for hydrogeologic evaluation and feasibility modeling of indirect potable reuse (IPR) project. Effort includes development and evaluation of multiple implementation scenarios, simulation of IPR water injection and extraction, interaction of surface water and groundwater, computation of residence time to meet state regulations and identification of critical flaws. Provided recommendations on aquifer testing and well design.

Groundwater Resource Evaluation, Online Water Well Management System, and Water Well Inventory, University Lands, Midland, Texas
Principal-in-charge for evaluation of multiple brackish aquifers underlying University Lands in west Texas. Project included database development, construction of three-dimensional geologic models, and hydrogeologic analysis of multiple aquifers, including production zones, expected well yield and water quality. The water well management system allows oil and gas operators and other University Lands leaseholders to apply for water supply well permits and upload completed water well information, such as well diagrams, geophysical logs, and water quality. GIS development for the groundwater resource evaluation included compiling data related to several thousand oil and gas geophysical logs, water well logs, and cable-tool driller reports obtained from University Lands, Texas Railroad Commission and the Bureau of Economic Geology well log libraries. DBS&A also compiled, and mapped water levels, water quality information, and water well production capacities.

EXH. #6
15723

T. Neil Blandford, P.G.

Senior Vice President, Principal Hydrologist

Groundwater Appropriation, Carlsbad Basin, BOPCO L.P., Carlsbad, New Mexico
Principal-in-charge for application to appropriate 2,000 acre-feet per year of groundwater in the Carlsbad Basin, New Mexico. Conducted geologic and hydrogeologic analysis, and developed a three-dimesional groundwater flow model to assess the effects of the appropriation on groundwater and surface water resources, which included Pecos River flows and interstate compact compliance issues.

Groundwater Appropriation Protest, Lea County Basin, Multiple Protestants, Lea County, New Mexico
Provided expert hydrologic and geologic analysis on behalf of multiple protestants opposed to multiple applications for approproiation of groundwater in the Lea County Underground Water Basin.

Region O Water Plan, Llano Estacado Regional Water Planning Group and the High Plains Underground Water Conservation District, Lubbock, Texas
Principal-in-charge for development of a 50-year regional water supply plan to meet drought-of-record demands for Region O. The plan includes evaluation of existing water supplies, identification of potentially feasible water management strategies, selection and detailed evaluation of selected strategies, and prioritization for selection of funding.

Water Resources Support for Goliad County Groundwater Conservation District, Goliad, Texas
Principal investigator for assessment of the potential effects of in-situ leach uranium mining. Project involved hydrogeologic evaluation of site data, regional, and local groundwater flow and solute transport modeling for the Evangeline Aquifer and other hydrogeologic analysis, and expert testimony in a TCEQ administrative hearing. Provided technical support regarding District's petition to EPA regarding aquifer exemption and comments on rule making. Also assisted the District with evaluation of background water quality and an assessment of surface water -groundwater interaction.

Hood vs. Bounds, Black River Village, New Mexico
Conducted expert geologic and hydrologic analysis to determine sources of groundwater and spring flow and the fate of irrigation water within a local aquifer system in the vicintiy of Black River Village, New Mexico.

Clint Texas Dewatering Case, Snapka Law Firm, Clint, Texas
Conducted expert hydrologic analysis of extent of dewatering conducted to construct a sewer line and pump station in the Town of Clint. Multiple homeowners, businesses and a historic church alleged structural damage due to subsidence.

Municipal Well Field Development and Sustainability Analysis, Colorado River Municipal Water District, Ward County, Texas
Principal investigator for due diligence analysis for a major water right purchase in Ward County, Texas. The water right purchase was followed by a program of test drilling, construction and aquifer testing of 21 high-capacity, raw water supply wells. The well field build-out was required to supplement existing groundwater supplies and was completed on a highly expedited schedule. A groundwater flow model was constructed to assist with well field operations, determination of well-field sustainability, and groundwater resources planning.

Groundwater Analysis and Planning Support, Colorado River Municipal Water District, West Texas
Principal-in-charge or principal investigator for multiple groundwater analysis and planning projects, including evaluation of the Snyder well field, assistance with development and evaluation of desired future conditions for multiple aquifers, evaluation of alternative and additional sources of water supply, and evaluation of potential sources for groundwater contamination within or near existing well fields.

Investigation and Characterization of Deep Saline Water, Hideout of Lincoln County, LLC, Lincoln County, New Mexico,
Project manager for completion and testing of two deep (greater than 2,500 feet) exploratory brackish aquifer water supply wells. Project included well design, permitting, and reporting; drilling oversight; aquifer testing design; implementation and analysis of results; collection of water quality and isotope samples for geochemical fingerprinting for the determination of water sources; and groundwater flow modeling for the assessment of hydrologic effects of utilization of the deep brackish groundwater.

Simulation of Groundwater Flow for Aquifer Storage and Recovery Project Permitting, Cities of Rio Rancho and Albuquerque, Bernalillo County, New Mexico
Conducted numerical simulations of aquifer conditions to obtain State Engineer permits for multiple aquifer storage and recovery projects. Two projects involve injection wells and one project involves surface infiltration. Conducted analysis of effects of aquifer storage and recovery on surface water balance of the Rio Grande.

Analysis of Municipal Water Supply Sources from the Southern Ogallala Aquifer, City of Lubbock, Texas
Project manager and principal investigator for assessment of sustainability of the City's Bailey County well field and pumping groundwater from beneath the City to assist with meeting peak water demands. Ogallala aquifer water quality beneath the City was also considered, as was the contributing zone for proposed water supply wells. Project included the development of historical water level maps and other hydrogeologic analysis, along with development of detailed groundwater flow models for the City of Lubbock area and the Bailey County well field area. Study results were used by the City to make key water planning decisions.

Development of Groundwater Availability Model for Edwards-Trinity (High Plains) Aquifer, Texas Water Development Board, West Texas
Principal investigator for the development of a numerical groundwater flow model of the Edwards-Trinity (High Plains) aquifer in Texas and New Mexico. Project involved extensive data collection and development of the geologic framework of four lower Cretaceous hydrogeologic units based on geophysical and geologic well logs and development of new conceptual models of groundwater flow. Information was employed to develop a three-dimensional groundwater flow model that will be used by groundwater conservation districts and regional water planning groups to evaluate future groundwater availability.

Expert Testimony Regarding Municipal Appropriation of Water in the Middle Rio Grande Basin, City of Rio Rancho, New Mexico
Provided expert analysis and testimony on behalf of the City of Rio Rancho against an adjacent water utility that sought to appropriate 26,000 acre-feet per year of groundwater. Conducted detailed numerical modeling and other hydrologic analysis to illustrate adverse effects on Rio Rancho. The adjacent water utility's application was denied by the State Engineer.

Hydrogeologic Analysis of City of San Angelo Hickory Aquifer Well Field, City of San Angelo, Texas
Provided senior-level review and support for hydrogeologic analysis of the City's Hickory aquifer well field. Project tasks included groundwater sampling, borehole geophysical logging, and hydrogeologic mapping and analysis of key geologic units and water quality constraints.

Update and Recalibration of Rose Valley Groundwater Model for Permit Evaluation, County of Inyo, California
Principal investigator for substantial update and recalibration of an existing groundwater flow model in accordance with Mitigation Monitoring and Reporting Program of Conditional Use Permit 2007 003. Updates included conducting a basin-wide recharge estimate, refinement of the model grid and boundary conditions, improved calibration to historical water levels, and consideration of major historical stresses on the basin

(reservoir construction and pumping for irrigation) from 1915 through 2010. The updated model was used to reevaluate future pumping amounts and associated drawdown trigger levels at monitor wells that could occur without exceeding the allowable reduction in groundwater outflow to a terminal lake at the southern end of the valley.

Expert Testimony Regarding Numerical Groundwater Flow Modeling and Evaluation of Salinity Encroachment, City of Alamogordo, Tularosa Basin, New Mexico
Provided expert review and testimony regarding evaluation of multiple groundwater flow models, then applied the model results to predict hydrologic effects of a proposed groundwater appropriation of 10,000 acre-feet per year by the City of Alamogordo. Also conducted an assessment and provided testimony regarding the potential for encroachment of saline groundwater due to pumping the well field, and effects of groundwater pumping on spring flow.

Groundwater Supply Evaluation for the Eastern New Mexico Regional Water System, CH2M Hill, Inc., East Central New Mexico,
Applied regional groundwater flow modeling to evaluate the sustainability of future municipal water demand in Curry and Roosevelt Counties, eastern New Mexico. Groundwater from the Ogallala aquifer was one alternative evaluated as part of a long-term regional water supply study.

Assistance with Development of Groundwater Management Strategies, Hemphill County Underground Water Conservation District, Canadian, Texas
Assisted the district with evaluation of existing hydrogeologic data and groundwater management approaches, and provided recommendation regarding alternative approaches and application of the Northern Ogallala GAM. Assisted with defense of desired future conditions selected by Groundwater Management Area 1 to preserve surface water flows.

Water Supply Analysis and Expert Testimony for Water Rights Applications, Mesa Verde Enterprises, Inc., Tularosa Basin, Alamogordo, New Mexico
Principal investigator and expert witness for multiple water rights applications in the Tularosa Basin. Project involved analytical and numerical groundwater flow modeling, evaluation of local and regional hydrogeologic conditions, application of Tularosa Basin administrative guidelines, well field design, and assistance with plan of replacement negotiations in support of application to appropriate water.

Development of Groundwater Availability Model for Southern Ogallala Aquifer, Texas Water Development Board, High Plains of Texas and New Mexico
Principal investigator for development and application of numerical groundwater flow model for the Southern Ogallala aquifer in Texas and New Mexico, an area that exceeds 29,000 square miles. Project involved extensive data collection and incorporation into a numerical groundwater flow model using a geographic information system (GIS), model calibration and verification, presentation at public meetings, and detailed study documentation. The model was used by groundwater conservation districts, municipalities and other stakeholders to assist with water-supply planning efforts.

Evaluation of Current and Historical Underflow Across Newport-Inglewood Uplift, West Basin Water Association, Southern California
Project manager for evaluation of the historical underflow of groundwater between the Central Basin and West Coast Basin (CBWCB) across the Newport-Inglewood Uplift. Project involved review and analysis of numerous historical reports regarding the hydrogeology and history of WBCB areas, groundwater modeling and other types of hydrogeologic analysis.

Site Investigation, Groundwater and Solute Transport Modeling and Post-Closure Monitoring at the Pecos Mine and El Molino Tailing Impoundments, Cyprus Amax Minerals Corporation, Pecos, New Mexico
Project team member for site investigation activities and hydrogeologic analysis at the Pecos Mine and El Molino Mill and Tailing Operable Units (PMOU and EMOU). Principal investigator for development and application of a groundwater flow and solute transport model at EMOU, for quarterly sampling and reporting at both sites, and for the development of Compliance Monitoring Plans at both facilities.

Application for Appropriation of Groundwater, Aquifer Science, LLC, Sandia Basin, New Mexico
Responsible for hydrogeologic investigations, construction and testing of exploratory production wells, recharge analysis, groundwater model development and application, and expert testimony related to an application to appropriate up to 717 acre-feet per year of groundwater in Sandia Basin. Critical issues involved effect of groundwater pumping on surface water and drawdown at adjacent wells.

Groundwater Flow and Pit Water Quality Analysis for Little Rock Mine, Freeport McMoRan Tyrone, Inc., Tyrone, New Mexico
Principal investigator for development of a groundwater flow model to assess future hydrologic conditions at the Little Rock Mine and computation of open pit water quality post-mining.

Development of Stage 2 Abatement Plan Proposal for the Tyrone Mine, Freeport McMoRan, Tyrone, Inc., Tyrone, New Mexico
Principal investigator for the development of the Stage 2 Abatement Plan Proposal for Tyrone Mine. The Plan includes a detailed overview of groundwater impacts at the mine, historical and predictive groundwater flow modeling accounting for the effects of open pits, stockpiles and other mine facilities, geochemical transport modeling of 14 constituents of concern, and proposed abatement measures for the mine site, an area of approximately 15 square miles.

Regional Assessment of Section 8 Groundwater Conditions and Conjunctive Use Evaluation, Navajo Nation, City of Gallup and Uranium Resources, Inc., San Juan Basin, New Mexico
Principal investigator for the assessment of hydrogeologic conditions in the vicinity of URI's proposed Section 8 uranium in situ recovery project, and determination of the risk that the proposed mining operation could adversely impact groundwater supplies to be developed as part of the Navajo-Gallup Water Supply Project.

Water Rights Technical Support, Denver Water, Denver, Colorado
Conducted quantitative analysis and expert review of stream depletion computations using numerical and analytical methods.

Assessment of Seawater Intrusion, Confidential Client, Southeast Atlantic Coast
Project manager for the evaluation of seawater intrusion related to an industrial facility near the coastline of the southeastern United States. Considered multiple potential sources of seawater intrusion and directed the simulation of density-dependent groundwater flow and solute transport modeling.

Development of Groundwater Flow and Solute Transport Model to Assess the Effects of Property Development, Basic Remediation Company, Henderson, Nevada
Developed a groundwater flow and solute transport model to assess the effects of proposed development on groundwater levels for property adjacent to the Las Vegas Wash. Model considers multiple water-bearing zones, multiple sources of recharge that vary over time, and heterogeneous aquifer conditions. Transport simulations include multiple plume constituents. Model work plan and simulation results were reviewed and approved by Nevada Department of Environmental Protection prior to application to predict future conditions.

Investigation of Water Rights and Water Supply Issues for Multiple Power Plants, Xcel Energy, Texas and New Mexico
Principal investigator for the review and analysis of various water rights and water supply issues related to multiple power plants in the southwest.

Instructor for Vadose Zone Short Course on Coal Bed Methane, State of Wyoming, Sheridan, Wyoming
Developed and taught modeling portion of coal bed methane vadose zone course developed for Wyoming state regulators.

Municipal Water Supply Investigation, City of Truth or Consequences, New Mexico through BASCOR Engineering
Principal investigator for evaluation of potential sites for water resources development. Provided recommendations regarding sites for potential groundwater development considering impacts to existing water rights, State Engineer policy, and likelihood of obtaining sufficient water supply. Planned and oversaw implementation of aquifer testing and analysis. Provided testimony regarding water supply at public City Commission meeting.

Brine Plume Remediation Well Field Design and Expert Testimony, Pioneer Natural Resources, East Poplar Well Field, Montana,
Principal investigator for hydrogeologic assessment and development of numerical groundwater flow and solute transport model for remediation well field design. Client used the results of the study to implement remedial action to limit plume migration and ensure that municipal wells would not be impacted. This effort was a significant component of a larger project that received the 2008 Department of the Interior Environmental Achievement Award. Also served as an expert witness in related cost-recovery case regarding hydrogeology, brine transport, and timing of releases to the environment, and assisted with negotiations with U.S. EPA regarding sampling requirements and a proposed Administrative Order on Consent.

Groundwater Model Development for Assessment of Groundwater Capture and Design of System Improvements for Sprague Road Groundwater Plume Superfund Site, U.S. Environmental Protection Agency (EPA) Region 6, Odessa, Texas
Principal investigator for development and application of a revised groundwater flow and solute transport model to assess groundwater capture system effectiveness. Project involved evaluation of existing model and included significant modifications to the technical approach and input parameters to address initial model limitations. The updated model will be used to modify the pumping strategy to achieve better capture of multiple chromium plumes that exist at the site and to locate additional monitoring wells to ensure capture is complete.

Applied Hydrologic Modeling Course Instructor, New Mexico Institute of Mining and Technology, Socorro, New Mexico
Served as course instructor for several sessions of a graduate-level hydrologic modeling course. Developed and presented course materials on numerical groundwater model development and application.

Independent Review of Assessment of Hydrologic Impacts, Village of Galisteo through Commonweal Conservancy, Santa Fe County, New Mexico,
Provided an independent review and opinion regarding the effects of a proposed development on the water supply of the Village of Galisteo. Reviewed available data, literature, and reports of other professionals. Village relied on findings to help determine how to proceed with a water rights transfer protest.

Evaluation of District-Wide Hydrogeology and Mine Expansion, Confidential Client, New Mexico
Led project team to evaluate mine site hydrogeology and the source of existing and future groundwater inflows to existing and proposed open mine pits. Analysis was conducted using field investigations, geochemical fingerprinting, and numerical groundwater flow modeling. The project results assisted the client with making key operational and regulatory decisions.

Little Colorado River Adjudication, The Hopi Tribe, Hopi Indian Reservation, Arizona
Serving as groundwater hydrology expert representing the Hopi Tribe in litigation and related negotiations regarding Navajo and Coconino aquifer water resources and sustainability. Tasks include evaluation of groundwater resources, development of aquifer management plans and concepts, guidance regarding production well placement and expected long-term yield, predictions of groundwater withdrawals on wells of other ownership and surface water flows (stream and springs), and review and comment of work conducted by other experts, and expert tetimony.

Return Flow Analysis and Expert Testimony, Berrendo Cooperative Water Users Association, Roswell, New Mexico
Planned and supervised test drilling and used finite element variably saturated flow modeling and other hydrogeologic analyses to assess the volume and timing of return flow from septic leach fields for a large water cooperative with more than 1,500 service connections. Provided expert testimony regarding timing and volume of return flow for a variety of hydrogeologic conditions that occur within the cooperative service area.

Monitor Well Construction and Hydraulic Testing, Tyrone, New Mexico, Freeport McMoRan Tyrone, Inc.
Project manager for the design, permitting, installation, and development of 26 monitor wells completed 200 to 900 feet deep in granite and conglomerate. Conducted hydraulic (aquifer) testing and analysis of aquifer parameters for 10 wells.

Evaluation of New Mexico Office of the State Engineer Administrative Model for Lea County Underground Water Basin, Lea County, New Mexico, Lea County Water Users Association
Assisted with evaluation of the OSE administrative model developed for the High Plains aquifer of the Lea County Basin. Purpose of the evaluation was to determine the suitability of the model for predictive water resources analysis. Project included evaluation and comparison of aquifer base elevation values and assignment of aquifer hydraulic properties.

Design of Groundwater Capture System for State Road 114 Superfund Site, Texas Commission on Environmental Quality (TCEQ), Levelland, Texas
Principal investigator for development and application of a groundwater flow and solute transport model to design a remediation well field for the State Road 114 Superfund Site. An existing regional model for the Southern High Plains (the Southern Ogallala groundwater availability model [GAM]) was modified to improve the historical calibration in Hockley County, and a nested, multi-layer local model was developed to simulate groundwater flow in the vicinity of the dichloroethane (DCE) plume and used to design a groundwater capture system. Simulation results were used by the EPA to design and cost the groundwater plume extraction system.

Instructor for Groundwater Sampling Short Course, Freeport McMoRan, Inc., Chino and Cobre Mines, New Mexico
Co-developed and taught groundwater sampling short course for environmental staff at the Tyrone, Chino and Cobre copper mines near Silver City, New Mexico. Provided classroom and field instruction.

Expert Testimony Regarding Water Rights Transfer in Indian Basin, New Mexico, Glenn's Water Well Service
Conducted hydrogeologic analysis and provided expert testimony regarding source of water, hydrologic effects of a proposed transfer, discharge areas of subject water, and effects of groundwater use on a major spring.

Assessment of Water Rights Purchase, Confidential Client, West Texas,
Provided recommendation regarding purchase of Ogallala aquifer groundwater rights in West Texas. Reviewed aquifer conditions and hydraulic parameters, assessed effects of nearby pumping, and conducted predictive groundwater flow modeling to evaluate expected drawdown.

Development of Stage 1 Abatement Plan for Tyrone Mine, New Mexico, Freeport McMoRan Tyrone, Inc., Tyrone, New Mexico
Principal investigator for development and submission of Stage 1 Abatement Plan for the Tyrone Mine. The plan consists of a comprehensive evaluation of groundwater and hydrogeologic conditions, and delineation of the extent of impacted groundwater. Assisted the client with planning and execution of additional work and negotiations with the regulatory agency.

Tyrone Mine Closure/Closeout and Technical Hydrology SupportFreeport McMoRan Tyrone, Inc., , Tyrone, New Mexico
Provided technical oversight, served as project manager, and conducted numerous technical studies and tasks at the Tyrone Mine related to groundwater issues. Examples include aquifer testing of monitor and production wells, development and execution of site investigation and corrective action studies, evaluation of sources of groundwater contamination and the nature and occurrence of groundwater at the mine, and assistance with various legal and regulatory issues related to groundwater.

Litigation and Negotiation Support Regarding Natural Resource Damage Assessments (NRDA), New Mexico, Two Confidential Clients
Provided expert advice and testimony regarding NRDA issues for two clients in New Mexico. Both cases involved the assessment of potential impacts of contaminants to groundwater resources.

Expert Testimony Regarding Mine Closure/Closeout Issues, Freeport McMoRan Tyrone, Inc., Tyrone, New Mexico
Provided expert testimony during New Mexico Environment Department and New Mexico Water Quality Control Commission hearings. Areas of testimony included groundwater hydrology of the Tyrone Mine area under current and closure/closeout conditions, locations of reasonably foreseeable future use in the vicinity of the mine, and the potential for mining operations to have adverse impacts on groundwater resources and adjacent users. Testimony was based on modeling and other quantitative analyses of seepage through stockpiles and tailing impoundments, and the influence of multiple open pits on groundwater flow.

Evaluation of Proposed Groundwater Appropriations on Remediation Well Field Effectiveness, Lynx Ltd., NASA White Sands Test Facility, New Mexico,
Evaluated potential effects of several applications for appropriation of groundwater on remediation system effectiveness in the Jornada Basin in New Mexico. Conducted drawdown, capture zone, and sensitivity analyses for several alternative water development scenarios.

Litigation Support and Modeling, Tucson Airport Authority, Tucson, Arizona
Technical leader and task manager for more than five major modeling tasks for cost allocation and litigation support at a major Superfund site. Modeling tasks included historical calibration of groundwater flow and solute transport models, predictive simulations, and local-scale multiphase (air, water, dense nonaqueous-phase

liquids) simulation. Advanced geostatistical techniques (block kriging and indicator kriging) were applied during model development.

Groundwater and Surface Water Impact Analysis and Expert Testimony, Hubbard Enterprises, Inc., Lincoln County, New Mexico
Developed three-dimensional groundwater flow model of upper reaches of Hondo Underground Water Basin for groundwater and surface water (streams and springs) impact analyses. GIS was used as an integral component of model development. Provided expert testimony in State Engineer hearing regarding groundwater and surface water impacts.

Expert Review of Water Supply Studies and Hydrologic Analyses, City of Albuquerque, New Mexico
Provided expert third-party review of modeling and other studies conducted by another consultant on behalf of the City to support its water resources management strategy and associated water rights application for combined surface water and groundwater use.

Evaluation of Return Flow of Treated Effluent, Rancho Encantado, Tesuque, New Mexico
Planned and supervised test drilling and associated laboratory analysis for the assessment of potential return flow at a commercial facility. Assisted with development of innovative techniques (high-pressure injection into clay units) for subsurface disposal of treated effluent.

Groundwater Modeling Assessment of Alumina Refinery, ALCOA, Ludwigshafen, Germany
Principal investigator for groundwater modeling assessment of the potential for impacted seepage from a closed alumina refinery to impact a public water supply well field. A combined semi-analytical capture zone and solute transport model was applied to identify wells that could potentially be impacted and the timing of possible impacts.

Technical Assistance for Water Rights Transfer, Santa Fe Opera, Santa Fe, New Mexico
Analyzed hydrologic impacts of water rights transfer and designed return flow plan critical to proposed project's viability. Also developed subregional groundwater flow and solute transport models. Technical interface with the OSE and the NMED.

Technical Assistance and Expert Testimony for Water Rights Protest, Village of Corrales, New Mexico
Provided technical assistance to the Village of Corrales regarding its protest of a major water rights application made by an adjoining municipality. Analyzed groundwater models developed by applicant and OSE, conducted a well survey within the Village, and provided expert testimony.

Water Rights, Hydrologic, and Environmental Analysis, Pueblo of Acoma, New Mexico
Conducted hydrologic water rights analyses, provided training on hydrologic issues and water resources, developed spring sampling plan, conducted detailed review and analysis of complex regional groundwater flow model, and assisted with development of water quality standards and water code.

Remediation Well Field Design and Contaminant Transport Simulation, AlliedSignal Technical Services, NASA White Sands Test Facility, White Sands, New Mexico
Project manager and principal investigator for design of remediation well field for multi-component contaminant plume that extends several miles from source areas within alluvial sediments and adjoining, structurally complex, fractured rock. Alternative well field designs were tested using three-dimensional groundwater flow, groundwater pathline tracking, and solute transport models. Model was also used to support site risk assessment.

Pit Lake Formation Modeling, Freeport McMoRan Tyrone, Inc., Tyrone, New Mexico
Principal investigator for the development of three-dimensional numerical pit lake formation model for multiple open mine pits that intersect regional groundwater. The model was both calibrated and validated to historical changes in pit water levels, accounting for groundwater seepage, surface water inflow, and evaporation. The model has been used to predict pit lake water levels and capture zones under various closure/closeout conditions and has guided high-level decision-making regarding both mine closure and mine expansion alternatives.

Remediation Well Field Design, New Mexico Environment Department, Hobbs, New Mexico,
Developed a three-dimensional groundwater flow model for municipal wells at an underground storage tank (UST) site. Model was applied to determine remediation well locations and pumping rates to maximize contaminant mass removal, provide plume containment, and provide wellhead protection to four municipal water supply wells in the plume vicinity.

Expert Opinion on Mine Application, Mining and Minerals Division of the New Mexico Energy, Minerals and Natural Resources Department, Copper Flat Mine, New Mexico
Conducted detailed review and provided expert opinion on impact analysis modeling and other hydrogeologic analyses conducted for mine permit application.

Hydrologic and Contaminant Transport Analysis, Confidential Client, Southern California
Project team member for multi-million-dollar cost allocation analysis for Superfund site. Assignments included innovative hydrogeological analysis, development and application of transient groundwater pathline tracking code, evaluation of effects of retardation on historical contaminant migration, and evaluation/critique of previous simulation efforts.

Hydrogeologic Analysis and Groundwater Flow Modeling, Waste Management, Inc., San Juan County, New Mexico,
Conducted hydrogeologic studies and sustained yield modeling for permitting of a regional landfill. Analyzed aquifer test and other hydrogeologic data, and conceptualized and simulated groundwater flow within multiple sandstone units.

Sustained Yield Analysis, Texzona Cattle Feeders, West Texas
Conducted groundwater modeling to determine sustainable groundwater resources of cattle feedlot. Planned and managed three-day aquifer test at site. Technical conclusions were used in support of negotiations during real estate transaction.

Capture Zone Modeling, Various Clients and Sites
Applied or reviewed application of various computer models for delineation of extraction well capture zones at several UST sites in New Mexico and Virginia. Modeling approaches ranged from simple analytical models to complex numerical codes.

Three-Dimensional Groundwater Flow Modeling, New Mexico Office of the State Engineer, Roswell, New Mexico
Participated in construction, calibration, and verification of multi-layer numerical model of Roswell Groundwater Basin to assist State Engineer with water rights adjudication and water resources planning. Modeling simulated impacts to Pecos River flows resulting from changes in groundwater pumping.

Water Resources Analysis, County of Santa Fe, New Mexico
Participated in review and analysis of County groundwater resources and assisted with development of recommendations for future groundwater management strategies and policy.

Little Colorado River Sediment Transport, The Hopi Tribe, Northern Arizona
Investigated primary sources and transport mechanisms/characteristics of suspended and bedload sediment in LCR system. Tasks included development of rainfall-runoff relationships and simulation of sediment yield throughout LCR basin.

Borehole Geophysical Analysis, The Hopi Tribe, Kykotsmovi, Arizona
Task manager and lead investigator for application of borehole geophysical techniques to determine potential for interaquifer leakage and groundwater quality degradation for three 1,000-foot-deep water supply wells.

Public Supply Well Wellhead Protection, Southwest Florida Water Management District, Hernando County, Florida
Project manager and principal investigator for delineation of wellhead protection areas (WHPAs) for approximately 60 major public supply wells. Conducted methods comparison study using semi-analytical modeling, flowpath delineation, and three dimensional numerical groundwater flow modeling combined with three-dimensional particle tracking to delineate WHPAs. Presented final recommended WHPAs to Hernando County Board of County Commissioners and Southwest Florida Water Management District in a public hearing and incorporated them into the County's comprehensive Water Resource Protection Plan. District used results of comparative analysis to guide WHPA delineation efforts in other counties.

Model Development and User Support, U.S. EPA Office of Solid Waste, Washington, D.C.
Provided regulatory support and modeling-related tasks for EPA Office of Solid Waste. Developed Monte Carlo simulation module for implementation in EPACMS (EPA Composite Model for Surface Impoundments) groundwater flow and solute transport code. Supervised statistical analysis of nationwide hydraulic conductivity data set for contaminated sites. Developed graphical postprocessor for EPACMS code, analyzed model sensitivity, and implemented code modifications.

Saltwater Intrusion Modeling, St. Johns River Water Management District, Orange County, Florida
Project manager and principal investigator in evaluation of regional groundwater resources using density-dependent groundwater flow and solute transport simulation techniques. Phases included development and calibration of regional, three-dimensional groundwater flow model (MODFLOW), delineation of WHPAs for major municipal supply wells, and cross-sectional and three-dimensional simulations of density-dependent groundwater flow and contaminant transport.

Model Development, Documentation, and Testing, U.S. EPA Office of Ground Water Protection, Washington, D.C.
Project manager for EPA-sponsored development and application of PC based, user-friendly computer code to delineate WHPAs for commonly encountered hydrogeologic settings. Code incorporates state-of-the-art analytical groundwater flow solutions, uses particle tracking to delineate several types of capture zones, and includes module that allows assessment of the effects of uncertain input parameters on the extent of capture zones. EPA distributes the WHPA code developed in this project nationwide for use by state and local technical staff.

Modeling Short Course Development and Presentation, EPA Office of Ground Water Protection, Washington, D.C.
Project manager and principal investigator for development and presentation of nationwide workshops on capture zone modeling and application of EPA WHPA code. Developed and presented modeling portion of two-day courses on delineation of WHPAs in fractured, confined, and karst aquifers.

Regulatory Support and Permit Evaluation, Florida Water Management Districts, Central Florida
Supervised and conducted modeling and review tasks, including critical reviews of modeling studies submitted in support of permit renewal for major municipal well fields and development and assessment of proposed saltwater intrusion criteria for determination of saltwater intrusion impacts. Supervised and reviewed cross-sectional density-dependent groundwater flow and solute transport modeling to determine extent of proposed Water Use Caution Area (WUCA). Conducted quasi three dimensional sharp-interface saltwater intrusion modeling in support of WUCA determination.

Model Development, Documentation and Testing, EPA Office of Ground Water and Drinking Water, Washington, D.C.
Project manager for development, validation, and application of VIRALT and CANVAS groundwater flow and viral transport computer codes developed for EPA Office of Ground Water and Drinking Water (OGWDW). Codes incorporate composite modeling approach: one-dimensional groundwater flow and solute transport modules for unsaturated zone are linked with two-dimensional simulation modules in saturated zone. Codes include menu-driven pre-processor and graphical post-processor. OGWDW staff used models in development of Ground Water Disinfection Rule.

Groundwater Flow Modeling, City El Paso, Texas
Applied USGS MODFLOW code to free surface water table and other complex boundary conditions to analyze impacts of municipal well field on multi layer aquifer system. Major issues were effects of groundwater pumping on surface water and water level declines in the aquifer.

Model Parameter Estimation and Uncertainty Analysis, New Mexico Water Resources Research Institute, Columbus, New Mexico
Conducted parameter estimation and uncertainty propagation analysis for Columbus Basin using finite element modeling, geostatistics, and non-linear optimization techniques. Managed project from data collection through documentation of model results. Calculated uncertainties in predicted model heads using first-order techniques.

Development of Surface Impoundment Transport Model, Washington, D.C., U.S. EPA Office of Solid Waste
Developed and applied Monte Carlo driver coupled with semi-analytical groundwater flow and transport code (EPACMS). Code was used to examine effects of uncertain parameter inputs on magnitude of aquifer contamination caused by leaky surface impoundments.

Contaminant Transport Modeling, Confidential Client, Seattle, Washington
Applied transient, semi-analytical particle tracking code to assess propensity of petroleum-based contaminants released in aquifer to reach major municipal supply well.

Model Development, Testing, and Application, Los Alamos National laboratory, New Mexico
Developed, tested, and applied Monte Carlo uncertainty analysis module for Disposal Unit Source Term (DUST) code for Mixed Waste Disposal Facility. Developed new simulation approach that resulted in reduced simulation run times. Assisted with screening analyses to rank radionuclide mobility and toxicity

Additional Professional Training

Capture Zone Analysis for Pump and Treat Systems, U.S. EPA Region 6 Training Course, 2007

Numerical Model Calibration and Predictive Analysis Using PEST and MODFLOW 2000, 2001

Introduction to ArcView GIS, 1998

Assessing Passive Biodegradation at Leak Sites, 1997

Dissolved Organic Contaminants in Ground Water, 1994

Diagnosis and Remediation of DNAPL Sites, 1993

Digital Geographic Information Systems, 1989

Wellhead Protection Area Delineation, 1989

Selected Publications and Presentations

Blandford, N., 2016. Overview of the University Lands Groundwater Resource Evaluation Project. Presentation to Environmental Study Group of the Society of Petroleum Engineers. Midland, Texas. April 28, 2016.

Schnaar, G., Blandford, N., 2015. Not Under My Back Yard: The Looming Battle Over Underground Injection. Presentation at the American Bar Association Fall Conference, Chicago, Illinois. October 28-31, 2015.

Umstot, T., Schnaar, G., Blandford T.N., Cullen, S., Kaiser, P., Ayarbe, J., 2015. Recharge estimates from a soil water-balance model improve groundwater model calibration. Presentation at the MODFLOW and More 2015: Modeling a Complex World conference. May 31 - June 3, 2015. Golden, Colorado.

Blandford, N., 2015. Overcoming Water Rights Challenges. New Mexico Chapter of the Society for Marketing Professional Services. Albuquerque, New Mexico, April 21, 2015.

Blandford, T.N. 2014. Aquifer Replenishment Projects in New Mexico—Technical Considerations, Challenges, and Permitting. Law Seminars International: New Mexico Water Law. Santa Fe, New Mexico, September 11, 2014.

Blandford, T.N. 2014. Effective Tools for Resolving Water Rights and Damages Issues. Law Seminars International: Hydrology and the Law. Santa Fe, New Mexico, July 23, 2014.

Marley, R., N. Blandford, A. Ewing, L. Webb, and K. Yuhas. 2014. Managed Aquifer Recharge as a Solution to Water Scarcity and Drought, European Geosciences Union General Assembly, Vienna, Austria. April 27 - May 2, 2014.

Marley, R. and N. Blandford. 2014. Water Rights Administration for Aquifer Replenishment Projects in New Mexico. NGWA Conference on Hydrology and Water Scarcity in the Rio Grande Basin. Albuquerque, New Mexico.

Blandford, T.N., T. Umstot, R. Marley, C. Wolf and G. L. Bushner. 2012. A Case Study of Exploration and Characterization of Deep Fractured Rock Aquifers for New Groundwater Development, New Mexico, U.S.A. Presentation to the International Conference on Groundwater in Fractured Rocks. Prague, Czech Republic, May 21-24, 2012.

Blandford, T.N. 2009. An Overview of Groundwater Management Approaches and Implications for MAG Permitting. Invited presentation to the Texas Alliance of Groundwater Districts. Arlington, Texas, September 29, 2009.

Blandford, T.N. and M. Kuchanur. 2008. Consideration of administrative management constraints in the development of groundwater supply strategies. Invited presentation to the Joint Meeting of the

Geological Society of America, Soil Science Society of America, American Society of Agronomy, and Crop Science Society of America. Houston, Texas, October 5-9, 2008.

Blandford, T.N., M. Kuchanur, and R. Smith. 2008. Groundwater modeling of the Southern High Plains Aquifer: Effects of pre- and post-development recharge on water availability. Invited presentation to the Joint Meeting of the Geological Society of America, Soil Science Society of America, American Society of Agronomy, and Crop Science Society of America. Houston, Texas, October 5-9, 2008.

Earley, D. III, E.A. Salvas, and N. Blandford. 2008. Stockpile Characterization and Hydrogeochemical Seepage Modeling for Mine Closure. 2008 National Ground Water Association / U.S. EPA Remediation of Abandoned Mine Lands Conference, October 2008.

Blandford, T.N. and D.J. Blazer. 2008. Effects of historical pumping distributions and changes in recharge for evaluation of municipal groundwater supply: A case study for the Southern High Plains of West Texas. Presented at MODFLOW and More: Ground Water and Public Policy. Golden, Colorado, May 19-21, 2008.

Blandford, T.N. 2007. Surface water-groundwater interaction, some technical considerations. Presented at Texas Water Conservation Association. San Antonio, Texas, October 11-12, 2007.

Blandford, T.N., D.J. Blazer, and A. Dutton. 2005. The effect of a priori knowledge on conceptual model refinement through numerical model development: A case study for the Southern High Plains of the United States. Invited presentation to ModelCARE 2005, Fifth International Conference on Calibration and Reliability in Groundwater Modeling, From Uncertainty to Decision Making. The Hague, The Netherlands, June 6-9, 2005.

Blandford, N. and N. Sweetland. 2005. Is your remediation system a source of groundwater contamination? Southwest Hydrology 4(3):10-11.

Blandford, T.N. 2005. Evaluation of return flow to groundwater in New Mexico. In Proceedings of New Mexico Water Law Conference. CLE International. Santa Fe, New Mexico, August 15-16, 2005.

Blandford, T.N., M.J. Ronayne, D. Earley III, and T. Shelley. 2004. Lake formation at multiple pits - model development, verification and application for closure. Presented at US EPA Office of Research and Development Pit Lakes, 2004 Conference, Reno, Nevada.

Blandford, T.N., D.J. Blazer, A.R. Dutton, and R. Smith. 2004. Regional groundwater availability modeling of the Southern Ogallala aquifer of West Texas and Eastern New Mexico. In Rainwater, K.A. and T.M. Zobeck (eds.), 2004 High Plains Groundwater Resources: Challenges and Opportunities, Conference Proceedings. Lubbock, Texas, December 7-9, 2004.

Blandford, T.N. and R. Smith. 2004. Conceptual model evaluation and refinement through numerical model development: A case study for the Southern High Plains of the United States. Presented at Finite Element Models, MODFLOW, and More: Solving Groundwater Problems Conference. Karlovy Vary, Czech Republic, September 13-16, 2004.

Blandford, T.N. and D.J. Blazer. 2004. Hydrologic relationships and numerical simulations of the exchange of water between the Southern Ogallala and Edwards-Trinity aquifers in southwest Texas. In Aquifers of the Edwards Plateau, Mace, R.E., E.S. Angle, and W.F. Mullican, III (eds.), Texas Water Development Board Report 360:115-131. February 2004.

Stephens, D.B. and N. Blandford. 2004. Hydrogeologic analysis, transport and modeling for environmental litigation: A case study. Presented at National Ground Water Association Ground Water and Environmental Law Conference. Chicago, Illinois, May 5-6, 2004.

Blandford, T.N., D.J. Blazer, K.C. Calhoun, A.R. Dutton, T. Naing, R.C. Reedy, and B.R. Scanlon. 2003. Groundwater availability of the Southern Ogallala aquifer in Texas and New Mexico: Numerical simulations through 2050. Prepared for the Texas Water Development Board. 160p.

Blandford, T.N., D.J. Blazer, A.R. Dutton, and T. Naing. 2003. Regional groundwater availability modeling of the Southern High Plains aquifer of west Texas and eastern New Mexico. In Proceedings of MODFLOW and More, 2003—Understanding through Modeling. Sponsored by International Ground Water Modeling Center, Colorado School of Mines, Golden, Colorado, September 16-19, 2003.

Blazer, D.J., K.C. Calhoun, and T.N. Blandford. 2003. Development of the Southern Ogallala groundwater availability model using GIS. In Proceedings of MODFLOW and More, 2003—Understanding through Modeling. Sponsored by International Ground Water Modeling Center, Colorado School of Mines, Golden, Colorado, September 16-19, 2003.

Blandford, T.N. 2003. What is a groundwater flow model and how do you know if you have a good one? In Proceedings of New Mexico Water Law Conference. Sponsored by CLE International, Santa Fe, New Mexico, August 18-19, 2003.

Blandford, T.N. and N.T. Sweetland. 2003. Rethinking traditional approaches to hydraulic capture in preparation for the next series of emerging chemicals of concern in groundwater. Poster presentation at the 1,4 Dioxane and Other Solvent Stabilizer Compounds in the Environment, Groundwater Resources Association of California, December 10, 2003, San Jose, California.

Blandford, T.N., D.J. Blazer, A.R. Dutton and T. Naing. 2003. Regional groundwater availability modeling of the southern High Plains Aquifer of west Texas and eastern New Mexico. In Proceedings of MODFLOW and More, 2003 - Understanding through Modeling. Sponsored by International Ground Water Modeling Center, Colorado School of Mines, September 16-19, 2003, Golden, Colorado.

Blandford, T.N., D.J. Blazer, and A.R. Dutton. 2003. Regional groundwater availability modeling of the Southern Ogallala aquifer of west Texas and eastern New Mexico. Presented at New Mexico Symposium on Hydrologic Modeling. Socorro, New Mexico, August 12, 2003.

Blandford, T.N., D.J. Blazer, A.R. Dutton, and R.M. Smith. 2003. Regional groundwater availability modeling of the Southern Ogallala aquifer in West Texas and Eastern New Mexico. Presented at National Ground Water Association Southwest Focus Conference—Water Supply and Emerging Contaminants. Phoenix, Arizona, February 20-21, 2003.

Blandford, T.N., M.J. Ronayne, and T.L. Shelley. 2003. Lake formation at multiple mine pits: Model development and application. Presented at National Ground Water Association Southwest Focus Conference—Water Supply and Emerging Contaminants. Phoenix, Arizona, February 20-21, 2003.

Blandford, T.N., D.J. Blazer, A.R. Dutton, and R.C. Reedy. 2002. Regional groundwater flow modeling of the Southern High Plains aquifer: Conceptual models applied and insights gained. Presented at Geological Society of America Annual Conference Special Session on Hydrogeology and Water Resources of the High Plains Aquifer: Issues for Public Policy Over the Next 50 Years. Denver, Colorado, October 27-30, 2002.

Blandford, T.N., M.J. Ronayne, and D. Earley, III. 2001. Simulation of lake formation at multiple mine pits in a block faulted porphyry copper deposit. In Proceedings of MODFLOW 2001 and Other Modeling Odysseys, An International Ground Water Modeling Conference and Workshops. Sponsored by International Ground Water Modeling Center, Colorado School of Mines, Golden, Colorado, September 11-14, 2001.

Stephens, D.B. and T. N. Blandford. 2001. Hydrogeologic analysis, transport and modeling for environmental litigation, a case study. Presented at the First International Congress on Petroleum Contaminated Soils, Sediments, and Water Analysis, Assessment and Remediation. London, United Kingdom, August 14-17, 2001.

Ronayne, M.J., T.N. Blandford, D. Earley, and R. Schmidt-Petersen. 1999. Simulation of mine pit lake recovery in a block-faulted porphyry copper deposit. Presented at the Annual Meeting of the Geological Society of America. Denver, Colorado, October 25, 1999.

Hsu, K.-C., D. Jordan, T.N. Blandford, D.W. Reaber, and J.L. Wilson. 1998. Evaluation of local-scale contaminant migration within a heterogeneous alluvial basin in the southwest. Presented at National Ground Water Association 1998 annual convention and exposition. Las Vegas, Nevada, December 13-16, 1998.

Stephens, D.B., K.-C. Hsu, M.A. Prieksat, M.D. Ankeny, T.N. Blandford, T.L. Roth, J.A. Kelsey, and J.R. Whitworth. 1998. A comparison of estimated and calculated effective porosity. In Hydrogeology Journal 6(1):156-165.

Jordan, D.L., T.N. Blandford, and R.J. MacKinnon. 1996. Source term analysis for a RCRA mixed waste disposal facility. In Proceedings of the International Topical Meeting on Nuclear and Hazardous Waste Management Spectrum '96. Seattle, Washington, August 18-23, 1996.

Blandford, T.N., N.-S. Park, and P.S. Huyakorn. 1994. Comment on "Well catchments and time-of-travel zones in aquifers with recharge" by D.N. Lerner. Water Resources Research 30(5):1627-1628. May 1994.

Birdie, T. and T.N. Blandford. 1994. Groundwater flow and solute transport modeling study for Seminole County, Florida, and adjoining regions. St. Johns River Water Management District Special Publication.

Blandford, T.N. and T. Birdie. 1993. Development of wellhead protection areas for the major public supply wells in Hernando County, Florida. Final report completed for the Southwest Florida Water Management District and Hernando County, Florida.

Huyakorn, P.S., J.B. Kool, and T.N. Blandford. 1993. An overview of modeling techniques for solute transport in groundwater. In Metals in groundwater, Allen, H., M. Perdue, and D. Brown (eds.). Lewis Publishers, Chelsea, Michigan.

Park, N., T.N. Blandford, and Y.S. Wu. 1993. CANVAS: A composite analytical-numerical model for viral and solute transport simulation. Code documentation prepared for U.S. EPA Office of Ground Water and Drinking Water.

Park, N., T.N. Blandford, and P.S. Huyakorn. 1992. VIRALT: A modular semi-analytical and numerical model for simulating viral transport in groundwater. Code documentation prepared for U.S. EPA Office of Ground Water and Drinking Water.

Blandford, T.N. and T. Birdie. 1992. Regional groundwater flow modeling for east-central Florida with emphasis on Orange and Seminole Counties. St. Johns River Water Management District Special Publication SJ92-SP17.

Blandford, T.N. 1991. Vertical cross-sectional modeling analysis of groundwater flow and saltwater transport in Orange and Brevard Counties, Florida. Prepared for St. Johns River Water Management District by HydroGeoLogic, Inc., Herndon, Virginia.

Blandford, T.N., T. Birdie, and J.B. Robertson. 1991. Regional groundwater flow modeling for east-central Florida with emphasis on eastern and central Orange County. St. Johns River Water Management District Special Publication SJ91-SP4.

Blandford, T.N. and P.S. Huyakorn. 1990. WHPA: A modular semi-analytical model for the delineation of wellhead protection areas. U.S. EPA Office of Ground Water Protection.

Blandford, T.N. and J.L. Wilson. 1988. Large scale parameter estimation and uncertainty propagation in the Columbus Basin, New Mexico. In EOS, Transactions of the American Geophysical Union 69(16):367.

Blandford, T.N. and J.L. Wilson. 1987. Large scale parameter estimation through the inverse procedure and uncertainty propagation in the Columbus Basin, New Mexico. New Mexico Water Resources Research Institute Report No. 226, Las Cruces, New Mexico.

Blandford, T.N. 1984. The mineralogy of an andesine anorthosite body near Montpelier, VA. In Rocks and Minerals 61(2):57-61.

Huyakorn, P.S. and T.N. Blandford. 1989. A comprehensive model for capture-zone delineation and particle tracking contaminant transport analysis. Presented at the 28th International Geological Congress. Washington, D.C.

Huyakorn, P.S., J.B. Kool, and T.N. Blandford. 1989. An overview of modeling techniques for metal transport in groundwater. Presented at Workshop on Metal Speciation and Transport in Groundwaters. Jekyll Island, Georgia.

Blandford, T.N. and P.S. Huyakorn. 1988. An interactive WHPA delineation model that incorporates a methodology for uncertainty analysis. Presented at Wellhead Protection Conference. New Orleans, Louisiana.

Blandford, T.N. 1986. Variogram estimation for transmissivity in the Columbus Basin, New Mexico. Presented at New Mexico Geological Society Conference. Socorro, New Mexico.