

## Representative Projects

Here is a brief description of projects that represent Clear Creek Associates depth of experience in Water Resources, Environmental Services, Groundwater Modeling and Mining Support Services.

**Water Supply Investigation to Support Mine Development; Confidential Client, Southeastern Arizona.** Clear Creek Associates personnel have managed the evaluation of groundwater supply resources for an international mining company since the mid-1990's in order to identify and develop groundwater resources for their copper mines in the area. In 2007 and 2008, Clear Creek Associates evaluated the feasibility of developing a groundwater supply to support a new mine. The objective was to characterize the potential of a local bedrock aquifer to supply water for mine operations. Over twenty 1,500 to 2,000-foot deep test wells were installed. The investigation included well site selection, contractor oversight, lithologic logging, downhole geophysical logging, and aquifer testing. A surface geophysical survey was conducted to aid in drill site selection. The results of the investigation demonstrated the existence of a bedrock aquifer system that could provide an adequate water supply.

**Groundwater Flow and Mass Transport Modeling; Arizona Department of Environmental Quality, Broadway-Pantano Superfund Site, Tucson, Arizona.** Clear Creek Associates recently completed a groundwater and contaminant transport modeling study for the Arizona Department of Environmental Quality (ADEQ). The purpose was to develop a model of the Tucson basin aquifer system that can be used by ADEQ to evaluate how best to clean-up a 3-mile long PCE plume that has impacted an important portion of the Tucson aquifer in the area of two closed landfills. The plume has forced the shut-down of several municipal supply wells and has the potential to affect several others. The model provides ADEQ with a critical analytical tool that can be used to predict the relative performance of various clean-up alternatives.

**Hydrogeologic Study for Industrial Facility, Sterling, Virginia.** Clear Creek Associates completed a hydrogeologic study and water supply investigation for an industrial facility located in Sterling, Virginia. The objectives of the study were to i) develop a groundwater source of water to support facility operations, and 2) collect the information needed to accommodate county hydrogeologic study requirements. Clear Creek Associates compiled and assessed existing hydrogeologic data for the site and conducted geological mapping of the 17 acre facility. The mapping identified outcrops of diabase, a relatively impermeable geologic unit, west of the facility. To further investigate the occurrence of diabase at the site, Clear Creek completed a surface geophysical survey using the electrical resistivity method. The surface survey confirmed the presence of diabase in the vicinity of the site. Three test wells were sited based on the results of the survey and the geologic mapping. The test wells targeted fracture/fault zones in the diabase and a metamorphosed siltstone unit adjacent to the diabase. The test wells were installed to depths up to 600 feet. A long-term 48-hour aquifer test was conducted on the most productive well. The results of the study successfully demonstrated local groundwater sources sufficient to support facility operations. In accordance with county requirements, Clear Creek completed an analysis comparing aquifer recharge versus long-term production rates. Finally, Clear Creek developed recommendations for conversion of one of the test wells into a water production well for facility operations.

**Food-Processing Facility, Southeastern Virginia.** Clear Creek Associates staff assisted a food-processing facility with renewal of their Groundwater Withdrawal Permit (GWWP). The Virginia Department of Environmental Quality (VADEQ) required the facility to conduct a traditional, single-pumping well aquifer test as part of their permit renewal. Staff developed a technical report explaining why the facility could not perform a traditional single-well pumping test and presented a work plan for an alternative pump test that would accommodate the facility's water needs and not require plant shutdown.

**Manufacturing Facility, Southeastern Pennsylvania.** Clear Creek Associates staff completed a Delaware River Basin Commission (DRBC) water withdrawal permit renewal application. Staff compiled 10 years of client water usage data, process flow diagrams, and plans for plant operations in support of the application. The permit was approved by the DRBC and allowed for groundwater withdrawals from multiple production wells and an emergency withdrawal from a surface water stream.



**Tucson International Airport Area Remediation Project, Tucson, Arizona.** Clear Creek Associates was retained by the City of Tucson to provide hydrogeological consulting services for this federal Superfund site involving a TCE plume. Initial RI/FS activities were conducted in the late-1980's, including a groundwater model constructed by Mr. Bartlett. The groundwater model was used to evaluate groundwater remedies and, ultimately, a groundwater pump and treat system was constructed consisting of nine production wells in two separate well fields. Clear Creek Associates' on-going activities at the site include updating the groundwater model to evaluate potential alternative pumping scenarios, and predicting clean-up times, data review and reporting to EPA, and well construction and rehabilitation assistance. In the mid-2000's, new laboratory analytical methods allowed for lower detection limits for 1,4-dioxane, at which time the presence of that compound was identified at the site. Clear Creek Associates helped the City of Tucson develop 1,4-dioxane plume management strategies, based on an evaluation of the groundwater flow and transport model.

**Buckeye Well 14 Design-Build Public Supply Well in Buckeye, Arizona.** Clear Creek Associates served as Primary Consultant and General Contractor of a Design-Build project for the design, installation and equipping of a new public supply well for the Town of Buckeye, Arizona. To meet the Town's need for timely construction of the well, Clear Creek conducted this project under our Arizona Contractor's License (Type A-4). Subcontractors for the work included the drilling contractor; geophysical logging company; analytical laboratory; pump company & above-ground infrastructure contractor; geotechnical company; civil engineer; and electrical engineer. Clear Creek Associates coordinated all subcontractors and maintained all bonds as the general contractor. We initially assisted the Town with site selection, and negotiated with the owner of the preferred well site, which was subsequently acquired by the Town. A Phase I Environmental Site Assessment of the land parcel was performed by Clear Creek staff, and the Clear Creek project team provided coordination of all permitting requirements (ADWR permits, ADEQ approvals, 404 permit issues, etc.). The selected well site was in a remote area near the western boundary of Buckeye, so construction water and electricity were unavailable. A temporary construction water well was drilled (and subsequently decommissioned) at the site to accommodate the construction activities, and the engineering subconsultant coordinated with Arizona Public Service to extend electrical power to the site. During drilling and installation of the well, Clear Creek personnel conducted hydrogeologic analyses of the pilot borehole (e.g., lithologic logging, geophysical log interpretation, depth-specific groundwater sampling, and depth-specific hydrologic testing). Based on the site-specific hydrogeologic information obtained from the pilot hole, the new well was constructed to provide optimum groundwater production (about 400 gpm) and potable water quality. Additional tasks performed by the Clear Creek project team included the design and construction of more than a ½-mile extension to the distribution pipeline and access road to the well site; design and construction of all on-site facilities and infrastructure (e.g., pump and electric equipment, SCADA system, chlorination, block wall around the site); and development of an O&M manual. The project budget was expanded due to assignment of additional work tasks, but all assigned work was completed within budget.

**Well and Geothermal Borehole Policy for Town of Purcellville, Virginia.** Clear Creek Associates has assisted the Town by developing new standards for the siting, permitting, construction, and testing of new wells. The new standards apply to new private domestic wells, industrial supply wells, irrigation wells, environmental wells, and closed loop geothermal borings to be installed within the Town's borders. The new standards address critical issues, including set-back requirements from pollution sources, adherence with County and State requirements, and conformance with wellhead protection policy. Most importantly, the new policy language includes provisions for demonstrating the operation of new wells will not impact the operation of any existing Town water supply well or source.

**Well Siting and Hydrologic Impact Analysis for Water Master Plan in Mesa, Arizona.** As a subconsultant to Black & Veatch, Clear Creek Associates provided a hydrologic evaluation of a 72-square mile area in southeastern Mesa to evaluate long-term water resource options for the City. Clear Creek reviewed available geologic and hydrologic data for the area and prepared numerous maps and figures, including a well inventory map; three hydrogeologic cross-sections; and maps showing groundwater elevation contours, structural contours, depth-to-bedrock, saturated aquifer thickness, historical land subsidence, groundwater quality, aquifer characteristics, well impacts, environmentally sensitive areas, and planned/existing infrastructure. In addition, numerous hydrographs were prepared for selected wells, and a groundwater flow model was constructed to provide a predictive tool for



assessing future hydrologic conditions within the study area. All the hydrogeologic and infrastructure information was incorporated into a well siting prioritization matrix, which was designed to generate a well site ranking map based on input of the prioritization criteria in each portion of the study area. The project succeeded in providing insight and direction for City staff to make informed decisions for future municipal well installations, and resulted in a comprehensive technical memorandum that was incorporated into the City's Water Master Plan.

**Public Supply Well Evaluations, San Antonio Water Company in Upland, California.** Clear Creek Associates, in conjunction with BESST Inc. and General Pump Company performed a well reconstruction evaluation on the San Antonio Water Company Wells No. 27A, 24 and No. 31. The issue at Well 27A was production rate decline and bacterial problems, and the issues at Wells 24 and 31 were escalating concentrations of DBCP and nitrate. The goal of these well evaluation projects was to assess the feasibility of reconstruction (structural modification) of the wells to improve pumped water quality. For each of these projects, Clear Creek reviewed existing historical well records, provided analysis of video surveys of the wells, provided oversight and analysis during dynamic (pumping) flow profiling surveys, and collected interval-specific water samples for analyses. The dye injection flow profiling method was used to quantify depth-specific groundwater contributions in each well, along with collection of interval-specific water quality information. As a result of our analyses and recommendations, Wells No. 27A, 24 and 31 were all modified with an engineered suction tube and/or inflatable packer, which resolved the water quality and water production issues.

**Evaluation of Calleguas Municipal Water District Wells in Moorpark, California.** Clear Creek Associates was subcontracted by General Pump Company to assess District Wells No. 12 and 16. The Well No. 12 had experienced a variety of pump equipment problems including worn and separated impellers, grooved hydraulic seal rings, and pitted and compromised column pipe. Clear Creek performed a modified step-rate pumping test, and a constant rate aquifer test to compare the well's performance with a baseline performance record from a spinner flow profile that was conducted when the well was installed. Clear Creek personnel also monitored the sand production in the well's discharge water at various pumping rates. Dye tracer flow profiling, spinner log profiling, and a dynamic video survey were also conducted in this well during a phase II investigation. At Well No. 16, a dye tracer flow profile was unsuccessful, due to an obstruction in the well. However, Clear Creek was able to provide a limited assessment of the well by evaluation of a step-rate pumping test and sand production monitoring. These well evaluations provided information and rationale for the hydraulic manipulation of the wells with engineered suction tubes, to reduce and manage the sand invasion during pumping.

**Evaluation of City of Ontario Wells No. 15 & No. 30 in Ontario, California.** Clear Creek Associates performed flow profile analyses on the City of Ontario Well No. 15 and No. 30 to assess the potential for improving their pumped water quality. This project included reviewing existing historical well records, video survey evaluations, oversight and analysis during static (non-pumping) and dynamic (pumping) spinner log surveys, collecting interval-specific water samples for analysis, and conducting aquifer testing concurrent with the flow profiling and sampling. Clear Creek Associates coordinated with General Pump Company to conduct the pump work. These wells were out of service for routine maintenance, so traditional flow profiling spinner log tools were used for this project.

**City of Phoenix Well 276.** Clear Creek Associates conducted a well reconstruction evaluation on the City of Phoenix Well 276 to identify the source of diethylhexylphthalate (DEHP) and arsenic. This was undertaken to evaluate whether elevated concentrations of these compounds could be mitigated through structural modification. This well is a 16-inch diameter, 1,242-foot deep well screened from 700 to 1,122 feet. Clear Creek Associates utilized BESST Inc. to conduct a dye tracer flow profile survey in the well using the rhodamine dye injection method, and to collect depth specific samples using the Micro Bailer method within the screened interval of the well. These data were used to evaluate aquifer conditions and future production concerns, as reconstruction of this well was determined not to be feasible for mitigating water quality issues.

**City of Phoenix Well 296.** Clear Creek Associates conducted a well reconstruction evaluation on the City of Phoenix Well 296 to identify the source of arsenic, to evaluate whether elevated concentrations of arsenic could be mitigated through structural modification. This well is an 18-inch diameter, 1,465-foot deep well screened from 990 to 1,430 feet. After attempting to conduct standard spinner logging, Clear Creek Associates utilized BESST, Inc. to



document the flow profile within the well using rhodamine dye injection method. This technique allowed flow profiling to be completed, as spinner logging tools could not be used due to well design. Depth specific samples using the Micro Bailer method were collected within the screened interval of the well. These data were used to evaluate aquifer conditions and future production concerns, as reconstruction was determined to be not feasible for mitigating water quality issues.

**City of Phoenix Well No. 299.** Clear Creek Associates was retained by the City of Phoenix to provide well design, construction management, testing and reporting services for the installation of a new aquifer storage and recovery (ASR) well. This well is an 18-inch diameter, 1,420-foot deep well. During drilling and installation of the well, Clear Creek personnel conducted hydrogeologic analyses of the pilot borehole (e.g., lithologic logging, geophysical log interpretation, depth-specific groundwater sampling, and depth-specific hydrologic testing). Based on the site-specific hydrogeologic information obtained from the pilot hole, the new ASR well was constructed to provide optimum groundwater production (over 2,000 gpm) and injection rates (about 1,800 gpm), and potable water quality. Post-installation aquifer testing of the new well included a dye tracer flow profile analysis of the well and interval-specific groundwater sampling, to establish a baseline for future well evaluations.

**City of Ontario (CA) Well No. 9.** As a subconsultant to General Pump Company, Clear Creek Associates provided an analysis of flow profile data to develop well reconstruction design recommendations. Clear Creek also provided construction management services for the modification of City of Ontario Well No. 9. This well produced groundwater with elevated concentrations of nitrate and perchlorate. Clear Creek Associates provided oversight and analysis of a video survey to assess the well's subsurface conditions, and also static (non-pumping) and dynamic (pumping) spinner logs, along with and depth-specific sample collection from the well. Clear Creek's assessment of the static spinner log indicated that a downward vertical gradient was present within the well under non-pumping conditions. Subsequent to the dynamic flow profiling, sample intervals were selected and the depth-specific sampling was conducted. Analysis of the data indicated that nitrate-impacted water was entering the upper portion of the well and migrating into the lower aquifer units due to the vertical hydraulic gradient. General Pump Company installed an inflatable packer to address the cross-contamination in this well, which resulted in a reduction of nitrate (as  $\text{NO}_3$ ) from approximately 45 ppm to less than 25 ppm.

**Former Southwest Cooperative Wholesale Property, Phoenix, Arizona.** Clear Creek Associates was retained by the City of Phoenix to perform due diligence for the Voluntary Acquisition Program on an 11-acre parcel of land located in an industrial area adjacent to Phoenix Sky Harbor International Airport. From the mid-1950s to approximately 1999, site operations included formulation of various bulk pesticides for both agricultural applications and cattle dipping. Toxaphene, a currently banned organochlorine pesticide, was identified as the primary chemical of concern (COC). After historical remediation to risk-based closure standards, the site received a No Further Action (NFA) determination by the ADEQ and a Declaration of Environmental Use Restriction (DEUR) was recorded to restrict the property to non-residential use.

Clear Creek conducted a Phase I ESA pursuant to the process prescribed in the ASTM E 1527-05 Standard Practice for Environmental Site Assessments which is compliant with the EPA Standards and Practices for AAI Rule, 40 CFR 312. In conjunction with the Phase I ESA, a review of numerous environmental documents including the Health Risk Assessment (HRA) was conducted to formulate an opinion on the appropriateness of the original site characterization, remediation activities, and risk-based closure that supported the existing NFA and DEUR documents.

As a result of the document review, Phase II activities included development of a Conceptual Site Model (CSM) and preparation of a SAP to fill data gaps created by unusable data. Existing usable data along with known survey points on the property were imported into ArcView and digitized to produce NAD 83 coordinates. An additional 224 soil samples were collected and analyzed utilizing rapid turnaround times. The results identified significant additional toxaphene contamination above the original cleanup goals as well as other COC's. Clear Creek developed potential remediation costs for several different remediation scenarios with the intent of reducing potential liability exposure for the City of Phoenix during negotiations with the property owner. After the City acquired the property, Clear Creek was retained to develop and oversee a Phase III remediation program including a human health risk





assessment that is being conducted in coordination with the Arizona Department of Environmental Quality Voluntary Remediation Program. Project deliverables included a Remedial Action Plan, Sampling and Analysis Plan, Quality Assurance Project Plan, and Excavation Plan. Phase III field work was initiated in December 2012 and was completed in February 2013. Excavated soils, concrete, and asphalt were tested and segregated for disposal based on RCRA waste determinations. In addition to the excavation of impacted soils, the remediation work included the demolition and removal of historical operational facilities including underground utility lines, power poles and substation and a septic system. Throughout the project, decontamination, dust, and stormwater controls were implemented to prevent the migration of contaminants off the property. Nearly 8,000 tons of soils and concrete were hauled offsite for disposal. Approximately 15% of that waste was RCRA hazardous waste by toxicity characteristic.

**Remedial Investigation and Feasibility Study Groundwater Flow and Mass Transport Modeling; Arizona Department of Environmental Quality, Broadway-Pantano Superfund Site, Tucson, Arizona.** Clear Creek Associates recently completed a remedial investigation for the Broadway-Pantano State Superfund Site, located in east Central Tucson. There are multiple components to the project. Most recently, Clear Creek completed a field investigation and prepared an RI Report for the Landfill Operable Unit, which includes two closed municipal landfills. The focus of the LOU RI was residual soil, soil-vapor, and groundwater volatile organic compound (primarily PCE, TCE, and Vinyl Chloride) impacts near the former source areas. The LOU RI also included a vapor intrusion (VI) assessment. A groundwater operable unit (GOU) is also a component of the Site. Clear Creek Associates supported the assessment of remedial alternatives for the GOU by completing a groundwater and contaminant transport modeling study for the Arizona Department of Environmental Quality (ADEQ). The purpose was to develop a model of the Tucson basin aquifer system that can be used by ADEQ to evaluate how best to clean-up a 3-mile long PCE plume that has impacted an important portion of the Tucson aquifer in the area of the two closed landfills. The plume has forced the shut-down of several municipal supply wells and has the potential to affect several others. The model provides ADEQ with a critical analytical tool that can be used to predict the relative performance of various clean-up alternatives.

**Aggregate Mine Hydrologic Impact Analysis, Fairfax, Virginia.** Clear Creek Associates completed a hydrogeological assessment of an aggregate mining operation located in Fairfax County, Virginia. The plant consists of two mine pits with operating levels approximately 350 feet below land surface. Aggregate consisting of diabase and hornfels (contact metamorphosed siltstone) are mined and processed at the facility. The purpose of the study was to evaluate geologic and hydrogeologic conditions in the vicinity of the mine, focusing specifically on the effect of mine operations on the local aquifer. Clear Creek Associates completed an analysis that relied on the following tasks:

- Field Investigation – Clear Creek geologists completed a field investigation that relied on geologic mapping, water level monitoring, and water quality sampling. The geologic mapping provided key information pertaining to the placement of key geologic units and the relationship between the occurrence and flow of groundwater within the local (near pit) system. Measurements collected during water level and quality monitoring were compiled and used to augment the records review.

- Well Inventory/Records Review – Clear Creek developed an inventory of all wells located within 10,000 feet of the mine. The inventory relied on driller logs provided by the County. The inventory included the following information: well location, date drilled, well depth, water level (at time of completion), lithology, and pump setting. A well inventory map was generated using the well location information, and map series overlays were developed using GIS to present key information, including total depth and water levels. Hydrogeologic cross sections were prepared using the lithologic data from the drill logs and the results of the in-pit geologic mapping.

- Analysis – Clear Creek Associates completed an analysis using the information collected during the field investigation and the well inventory. The analysis addressed the study objectives by presenting an interpretation on the hydraulic effects of mining on the local aquifer system. The mine owner is using the results of the analysis to develop future mine plans.

**Indoor Air and Sub-Slab Sampling, Pheonix, Arizona.** To address issues of soil vapor contamination for the Motorola 52nd Street Superfund Site, Clear Creek successfully completed an EPA compliant indoor air and sub-slab sampling effort in 2011. The program involved the development and implementation of a work plan which was



reviewed and accepted by EPA Region 9. The project involved the selection of individual residences, obtaining access to those residences, interviews with the occupants, and the collection of indoor air and sub-slab vapor samples. Based on results of the initial area soil gas investigation, the targeted residences were selected to evaluate potential for soil vapor intrusion. Home owners were identified and access agreements were negotiated to allow Clear Creek staff to conduct the sampling. Prior to collecting the indoor air samples, staff conducted an in home interview and completed an inventory of household products. During the interview, a plan view of the residence was prepared, potential sample locations identified, and household products that could interfere with results were requested to be removed. Roughly one week after the interview, the field staff entered each dwelling and deployed an indoor air sampler which collected a representative air sample from a room over a 24-hour period. Immediately after the indoor air sample was collected a sub-slab sample was drilled and a temporary probe was installed and sampled. All of the air samples were submitted to an EPA approved analytical laboratory for analysis. Upon completion Clear Creek prepared a report documenting our procedures and field findings.

**19th Avenue & Dunlap, Phoenix, Arizona.** Clear Creek Associates completed a Phase I ESA, a Phase II soil gas investigation, and a UST system closure on behalf of the City of Phoenix for a Light Rail Project acquisition property that was occupied by an automotive fueling facility for over 40 years. Clear Creek coordinated the work with the owner of the facility that was active for a portion of the work. In response to recognized environmental conditions identified in connection with the existing UST system, Clear Creek developed Phase II soil and soil gas sampling plan using a hollow-stem auger drilling rig to evaluate the presence of volatile organic compounds in the subsurface in the vicinity of current and former UST system structures. Results of the sampling did not indicate the presence of petroleum hydrocarbons. Following completion of the Phase II ESA, Clear Creek and their subcontractor Environmental Response, Inc. (ERI) completed the removal of three 12,000 gallon fiberglass USTs and associated components. Clear Creek managed all aspects of the project including permits and approvals, documentation, ADEQ reporting and closure, and final report preparation for the City.

**Confidential Client, Mine Mill Tailing Seepage Capture System Conceptual Design, Colorado (2012).** Clear Creek Associates assisted with the development of a conceptual design of wellfield to capture seepage from an existing mill tailing facility. Clear Creek completed the following tasks to support development of the design: existing data review, geologic mapping, installation and sampling of new monitoring wells, aquifer testing, and geochemical assessment. Our analysis found that seepage from the tailing facility was migrating through a shallow glacial/alluvial aquifer system. The study results required significant revisions of prior conceptual site models, particularly with regard to the width and thickness of the aquifer system and the extent of impacts. An updated conceptual site model, developed by Clear Creek, served as the basis for development of a groundwater flow and contaminant transport model. The model was the primary tool used to assess various alternatives, including natural attenuation, source control (lining), interceptor wells, and interceptor trench. Clear Creek used the model to optimize the location of extraction wells for effective capture. Detailed design drawings and preliminary cost estimates were developed for the capture wells. The system is anticipated to be installed in 2014.

**Phase I ESA and Cleanup of Hazardous and Non-hazardous Wastes for Several Parcels of Land Adjacent to the Hassayampa River, Central Arizona.** On behalf of a major valley home developer, Clear Creek investigated several RECs previously identified at the properties and developed a work plan for the removal of abandoned material and waste at the site including buildings, trailers, a cattle dip tank, fencing, concrete irrigation laterals, wood debris and miscellaneous debris. ERI was contracted to conduct the physical cleanup work at the site with oversight provided by Clear Creek. Waste segregation, profiling, and removal activities were conducted during site cleanup activities. Unknown chemicals were characterized and segregated for disposal. If applicable, samples from the unknown materials were collected and submitted to a fixed base laboratory for analyses. Upon completion of waste profiling, waste material was containerized and labeled in accordance with the appropriate waste classification. Following completion of waste profiling, the wastes and demolition debris were transported to approved facilities for disposal. Based on the analytical results and cleanup activities, the RECs were either removed or determined to be de-minimus. The work was completed as part of a property exchange between our client and The Nature Conservancy (TNC). The work was performed to the satisfaction of the TNC and the agreement was successfully completed.



**Wildcat Shooting Range Characterization and Cleanup, Central Arizona.** Clear Creek evaluated existing soil characterization data for lead impacted soils at a wildcat shooting range for a major valley home developer and developed a work plan for additional characterization to facilitate a remediation approach at the one-acre area. Clear Creek developed a field sampling grid and composite sampling strategy prior to conducting the additional soil sampling. The results were used to prepare the estimated volume of impacted soil necessary for removal to achieve the remediation goal and a bid specification for remediation contractors. Clear Creek provided oversight of the remediation contractor and verification sampling services for the stabilization by ECOBOND®, removal, and disposal of impacted soils. The lead impacted soil was successfully stabilized and qualified as non-hazardous waste. Expedited analytical laboratory turnaround times were utilized to verify removal of impacted soils during cleanup activities to achieve the remediation goal. The approach developed by Clear Creek to conduct additional characterization, development of volume estimates, and manage waste was successful in meeting the client's budget and timeframe.

**City of Phoenix PHX Sky Train™ Property Acquisition – Drywell Investigations and Clean Closures at the Former Baker Insulation and Former Eastside Fleet Properties.** Clear Creek Associates completed sediment sampling and attained clean closures for drywells on behalf of the City of Phoenix at PHX Sky Train™ acquisition properties located on the northeast side of Sky Harbor International Airport. Clear Creek performed the drywell investigations in accordance with ADEQ guidance. One drywell was located within the drainage of a UST system that exhibited petroleum hydrocarbon constituents in sediment (Baker Insulation Property). The second drywell was an atypical construction that exhibited metal constituents in sediment (Eastside Fleet Property). After sediment sampling and sediment removal activities were conducted, clean closure was successfully attained from the ADEQ. Clear Creek subcontracted the services of MP Environmental to decommission the drywells in accordance with ADEQ drywell decommissioning guidelines.

Clear Creek submitted the required notices to the ADEQ and subcontracted the UST removal contractor to remove a single 8,000 gallon UST and one dispenser island at the former Baker Insulation property. Results of soil sampling and visual evidence upon system removal indicated the presence of petroleum hydrocarbons between the UST and dispenser, but not above regulatory levels for detected constituents. Using results of the investigation and results of a previous investigation by others, Clear Creek successfully demonstrated that the observed concentrations were limited to a shallow horizon of soil and that no further assessment was necessary. The excavation area was backfilled and compacted to land surface and an ADEQ UST Permanent Closure Assessment Report Form and Notification for USTs Form were completed and submitted to the ADEQ as required. The ADEQ did not require any further action.

**APS Buckeye Service Center, Buckeye, Arizona.** Clear Creek Associates was retained by the Arizona Public Service Company (APS) to perform site characterization and remediation of soil and groundwater impacts from a leaking above ground storage tank (AST). Free product and high levels of MTBE along with BTEX were present in groundwater near the release. This project was conducted under ADEQ's Voluntary Remediation Program (VRP). As such, Clear Creek was responsible for the completion of a Community Relations Plan and establishment of a public repository for all documents produced. After completion of the site characterization, Clear Creek conducted pilot testing of an AS/SVE system to determine effectiveness and to develop design criteria. Following approval from ADEQ, the system was installed and operated by Clear Creek personnel. Monthly soil vapor sampling along with quarterly groundwater sampling at 21 monitor wells was conducted for a period of about 18 months during operation of the AS/SVE system. Clear Creek subsequently developed a closure work plan and has completed confirmation sampling. Mr. Wayne Feller managed the later phases of this project with field work conducted by Russ Granfors. Closure is currently pending administrative review by the ADEQ VRP.

**Motorola 52nd St. TCE Plume Investigation and Remediation, Phoenix, Arizona.** This project has many facets and has been on-going for more than 23 years. The 52nd St. contaminant plume is located through the central Phoenix area which poses many technical and logistical challenges. Mr. Bartlett has been managing investigation efforts for the site since 1989, and prior to that, was involved in designing groundwater models and the first of 3 remedies implemented at the site. Of particular relevance to this project is 1) the detailed and extensive investigations of groundwater contamination that have been completed at the site, 2) the exhaustive effort to review



and evaluate the contribution of other PRPs to the regional TCE plume contiguous with the 52nd St. plume, 3) the use of groundwater modeling to devise strategies to address the many issues created by the groundwater contamination in alluvium and fractured bedrock, 4) client advocacy with State and Federal regulators and the community at large, and 5) the role of Clear Creek Associates in obtaining groundwater quality samples and in managing the large amount of data generated for the site. More than 150 wells have been installed at the 52nd Street site; many were completed at multiple depths to allow vertical definition of the plume. The Honeywell 34th St. facility just north of Sky Harbor Airport is a known source of TCE and TCA contamination to groundwater. Clear Creek Associates reviewed hundreds of documents relating to the Honeywell site and used that information to recreate the historical discharges of solvents at the facility. The impact of the facility and the contributions to downgradient groundwater contamination were evaluated with a contaminant transport model developed by Clear Creek Associates. Finally, Clear Creek Associates' staff collects groundwater level and water quality data quarterly from many wells throughout the site and submits reports to regulatory agencies. Additional groundwater monitoring wells have been completed recently. All data are reviewed and managed by Clear Creek Associates.

