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Tiffany Thomas, Ph.D.

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Professional Profile

Dr. Thomas has 27 years of global in-depth experience in environmental forensic chemistry, including extensive focus on contaminant fate and transport; data and statistical analysis; remedial design; and novel chemical analyses, including isotopic, spectroscopic, and bench-scale analytical methods. Her project experience has addressed a wide-range of contaminant chemistries, including (but not limited to) petroleum hydrocarbons, chlorinated solvents, metallic and semi-metallic species, chemical weapons, munitions, pesticides, herbicides, polychlorinated biphenyls, dioxins, and per- and polyfluoroalkyl substances (PFAS). Clients have included chemical manufacturing, oil and gas, Department of Defense, commercial and municipal landfills, mines and associated metal processing facilities, water and wastewater treatment plants, and a range of other municipal and commercial facilities. She was also appointed to the governing board of the Oregon Department of Geology and Mineral Industries in 2024.

Dr. Thomas' applied chemical knowledge includes the application and interpretation of various geochemical, statistical, and fate-and-transport models. She regularly participates in project planning, sampling, and remedial design, providing project teams with a holistic view of the geochemical controls on contaminant migration and toxicity. She has worked at project sites both nationwide and internationally, interfacing and negotiating with federal, state, and municipal regulatory agencies across multiple districts. She has served as a consulting and testifying expert on matters related to various contaminant chemistries, including lead, arsenic, PCBs, and PFAS.

Voir la traduction française

Academic Credentials & Professional Honors

Ph.D., Chemistry, University of California, Davis, 2004

B.S., Environmental Chemistry, Northern Arizona University, 2000

Governing Board Member, Oregon Department of Geology and Mineral Industries, 2004-Present

Publications

S Basu, P Ali, Thomas T. Emerging Technologies for PFAS Control. Water Environment Federation; Chapter 11 in PFAS in the Water and Wastewater Sectors: Fundamentals, Management, and Treatment, August 2023.

Malek A, Arokianathar J, Haddad E, Matthew J, Thomas T. Global Regulations Around PFAS: The Past, the Present and the Future. International Chemical Regulatory and Law Review, 6 (1), 2023.

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Thomas T. Remediation of Buried Chemical Warfare Material. The National Academies Press, Washington D.C. at National Research Council of The National Academies (Committee Member), 2012.

Caldwell B, Britto R, Arnseth R, Thomas T. Iron Mediated Abiotic Degradation of RDX in a Contaminated Aquifer. Remediation – The Journal of Environmental Cleanup Costs, Technologies, & Techniques, 22 (3), 29-41, 2012

Land TA, Casey WH, DeYoreo JJ. Thomas T. The Emergence of Supersteps on KH2PO4 Crystal Surfaces. Physical Review Letters, 92 (21), 216103-1 – 216103-4, 2004.

Land TA, Johnson M, Casey WH, Thomas T. Molecular Properties of Adsorbates that Affect the Growth Kinetics of Archerite (KDP). Journal of Colloid and Interface Science, 280 (1), 18-26, 2004.

Land TA, Martin TM, Casey WH, DeYoreo JJ, Thomas T. AFM investigation of step kinetics and hillock morphology on the {100} face of KDP. Presented at the 2003 Annual Meeting of the American Association for Crystal Growth and Epitaxy, Keystone, Colorado, 2003.

Land TA, Martin TM, Casey WH, DeYoreo JJ, Thomas T. AFM investigation of step kinetics and hillock morphology on the {100} face of KDP. Journal of Crystal Growth, 260 (3-4), 566-579, 2003.

La Spisa S, Waldheim M, Lintemoot J, Naff J, Robinson M. Thomas T. Infrared and vapor flux studies of vapor-deposited amorphous and crystalline water ice films between 90 and 145 K. Journal of Geophysical Research Planets, 106 (12), 33351-33361, 2001.

Presentations

Caldwell B, Britto R, Arnseth R, Thomas T. Iron Mediated Abiotic Degradation of RDX in a Contaminated Aquifer. Platform presentation at the 2011 International Symposium on Bioremediation and Sustainable Environmental Technologies, Reno, Nevada, 2011.

Geraghty M, Caldwell B, Britto R, Arnseth R, Thomas T. Quantitative Metrics to Gauge the Effects of an Enhanced Biodegradation Program. Platform at the 2010 International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, 2010.

Caldwell B, Britto R, Geraghty M, Arnseth R, Thomas T. Statistical Metrics for the Identification of Interdependent Analytes. Poster at the 2009 Strategic Environmental Research and Development Program (SERDP) / Environmental Security Technology Certification Program (ESTCP) Conference, Washington, D.C., 2009.

Land TA, Johnson M, Casey WH, Thomas T. Experiments to Identify the Molecular Properties of Step-Pinning Adsorbates on KDP. Poster at the Goldschmidt Conference, Copenhagen, Denmark, 2004.

Project Experience

Litigation Support

Aqueous Film-Forming Foam (AFFF) Products Liability Litigation (D. South Carolina), Case No. 2:18-MN-2873-RMG. Testifying expert in the following cases: Town of Ayer v. 3M Company, et al., No. 2:19-CV-03120-RMG; City of Sioux Falls v. 3M Company, et al., No. 2:19-CV-1806-RMG; City of Stuart v. 3M Company, et al., No. 2:18-CV-3487-RMG. Expert reports and Deposition July 27, 2022. Project scope included regulatory records review, evaluation of defendant-specific PFAS marker/tracer chemicals, PFAS process chemistry research, and forensic analysis/interpretation of PFAS byproducts and degradation products.

California Sportfishing Protection Alliance v. Pacific Bell Telephone Co. (Eastern District of California), Case No. 2:21-CV-00073-JDP. Testifying expert in the above referenced case on matters relating to the geochemistry of lead in Lake Tahoe. Expert report September 5, 2024. This case settled out of court.

Institute for Fisheries Resources et al. v. Bridgestone Americas et al. (N.D. California), Case No. 3:23-CV-05748-JD. Testifying expert in the above referenced case on matters relating to the analysis of chemistry, degradation, and chemical fate and transport of N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine (6PPD) and N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine-quinone (6PPD-Q). Expert report March 21, 2025; Rebuttal report April 4, 2025; and Deposition April 23, 2025.

Aqueous Film-Forming Foam (AFFF) Products Liability Litigation (D. South Carolina), Case No. 2:18-MN-2873-RMG. Testifying expert in the following cases: Bien v. 3M Company, et al., No. 2:20-CV-00257-RMG; Donnelly v. 3M Company, et al., No. 2:20-CV-00209-RMG; Field v. 3M Company, et al., No. 2:20-CV-00301-RMG; Speers, et al. v. 3M Company, et al., No. 2:21-CV-03181-RMG; Voelker v. 3M Company, et al., No. 2:18-CV-03438-RMG Expert report April 18, 2025. Project scope included regulatory records review, evaluation of defendant-specific PFAS marker/tracer chemicals, PFAS process chemistry research, and forensic analysis/interpretation of PFAS byproducts and degradation products.

Confidential Client, Confidential Locations. Retained as a testifying expert on matters relating to PFAS in biosolids. These cases are ongoing.

Confidential Client, Confidential Locations. Retained as a testifying expert on matters relating to PFAS in surface and groundwater. These cases are ongoing.

Confidential Client, Confidential Location. Retained as a consulting expert on matters relating to PFAS forensics and remedial alternatives for cost allocation purposes. This case is ongoing.

Confidential Client, Confidential Location. Consulting expert on matters relating to PCBs, dioxins, and other contaminants in support of the responsible party's ongoing negotiations with cross-claim and third-party defendants regarding environmental conditions and remediation at a confidential Superfund Site. Project scope included regulatory records review, evaluation of defendant-specific marker/tracer chemicals, process chemistry research, forensic analysis/interpretation of process byproducts, and identification of industry-specific subject matter experts.

Confidential Client, Confidential Location. Provided technical assistance on matters relating to lead geochemistry and the responsible party's ongoing negotiations with cross-claim and third-party defendants regarding environmental conditions and remediation at a confidential Superfund Site. Project scope included interpretation of site data and isotopic analyses to opine on past sources of contamination.

Confidential Client, Confidential Location. Provided technical assistance on matters relating to arsenic geochemistry and the possibility of the defendant's criminal activities relating to on-site water treatment practices. Project scope included data evaluation and geochemical modeling, regulatory records review, process chemistry research, and identification of industry-specific subject matter experts. This matter settled out of court.

Confidential Client, Confidential Location. Provided technical assistance on matters relating product screening for potential use of PFAS in textile products.

Confidential Client, Confidential Location. Provided technical assistance on matters relating product screening for potential presence of PFAS in food products.

Confidential Client, Confidential Location. Provided technical assistance on matters relating product screening for potential presence of PFAS in food contact materials.

Confidential Client, Confidential Location. Provides technical assistance on matters relating product screening for potential presence of PFAS in consumer products. This case is ongoing.

Per- and Polyfluoroalkyl Substances (PFAS) Experience

Port of Seattle, Seattle-Tacoma International Airport. Managed the 5-year on-call contract awarded in 2022 to strategically address PFAS challenges at the Seattle-Tacoma International Airport (SEA). The scope of work included environmental investigations and evaluations, supporting the transition from PFAS-containing Class B AFFF to non-fluorinated foams, developing treatment plans across Port-managed facilities, assisting in negotiations with regulators, and communicating with neighboring communities. This contract is worth an estimated $10 million in project fees. Led the team that supports SEA in addressing PFAS and other emerging contaminants in surface water as part of a separate contract to SEA.

Boeing Company, Boeing Everett Facility. Supported site assessment and remediation related to PFAS at the Everett Facility. The scope of work included environmental investigations and evaluations, developing treatment plans, assisting in negotiations with regulators, and compliance with multiple regulatory programs.

RTX Company, Confidential Location. Supported site assessment and remediation related to PFAS at a confidential location. The scope of work included environmental investigations and evaluations, developing treatment plans, assisting in negotiations with regulators, and real estate liability.

Snohomish County, Paine Field International Airport (PAE). Managed the project supporting PAE with the transition from PFAS-containing Class B AFFF to non-fluorinated foams.

Spokane International Airport, Washington. Oversaw environmental investigations and evaluations, assisted in negotiations with regulators, and other related work associated with an ongoing Enforcement Order.

TARealty, Confidential Locations. Supported TARealty in site assessment and remediation related to PFAS at multiple confidential locations. The scope of work included environmental investigations and evaluations, developing treatment plans, assisting in negotiations with regulators, and real estate liability.

Confidential Clients, Washington and Illinios. Oversaw environmental investigations and evaluations related to emergency response events at two commercial/industrial locations.

Company-wide PFAS Subject Matter Expert. As designated PFAS Subject Matter Expert, designed the strategic market analysis for technical training and business development efforts company-wide, and provided presentations to and participation with a variety of local and national professional organizations. PFAS-related duties include oversight and coordination of internal training and conference attendance, design of region- and market-specific business development, and leadership of internal resources to provide as-needed project support to internal project managers and external clients.

Confidential Client, Multiple Locations. Oversaw and coordinated PFAS-related site characterization and remediation activities at multiple facilities in six states. Project scope included collaboration with on-site personnel and consultants, review of project planning and reporting documents, data validation of analytical data packages, and program administration to ensure consistency across state and federal regulatory bodies.

Reynolds, Smith & Hills (RS&H), Sacramento International and Stockton Metropolitan Airports. Assisted with the design of the sampling program and oversaw field sampling activities to delineate possible PFAS impacts originating from historical airport activities involving aqueous film-forming foam (AFFF). Project scope included generation of a sampling plan, field sampling oversight, coordination with airport and RS&H personnel, and data validation of the resulting analytical data packages.

Sullivan County, New York, Sullivan County International Airport. Assisted with the interpretation of data collected during field sampling activities to delineate possible PFAS impacts originating from historical airport activities involving AFFF. Project scope included identification of multiple PFAS sources with unique chemical fingerprints.

Department of the Navy, New London Submarine Base. Served as the chemical PFAS expert on a multidisciplinary panel that hosted a public open house designed to inform the community surrounding the base about upcoming sampling activities to identify possible off-base PFAS impacts originating from on-base fire suppression activities.

Department of the Navy, Multiple Locations. Assisted with the design of sampling programs to delineate possible PFAS impacts originating from historical base activities involving AFFF. Project scopes generally included generation of a preliminary site assessment, field sampling oversight, and interpretation of analytical data to define likely source(s) of contamination.

Site Investigation and Remedial Design

Confidential Client, Pump and Treat System Optimization, Torrance, California. Review and analysis of geochemical data to determine cause(s) of degraded pump and treat remedial system performance, including injection well fouling. Analysis of proposed system alterations and chemical usage to determine possible effects on system performance. Review and analysis of para-chlorobenzene sulfonic acid analytical methodologies.

Covidien Property, Site Characterization and Remediation, Santa Monica, California. Oversaw quarterly groundwater monitoring and soil vapor sampling. Negotiated with Regional Water Quality Control Board regarding site-specific screening values and potential installation of a soil vapor extraction system in pursuit of site closure.

Confidential Client, Isotopic Sampling for Site Characterization, Rialto, California. Designed and oversaw groundwater sampling for analysis of oxygen and chlorine isotopes to characterize a regional perchlorate plume. Performed statistical evaluation of data to determine relative percent contributions from the source materials for use in remedial design.

Multiple Clients, Site Characterization Statistical Analyses, Multiple Locations. Performed vigorous univariate and multivariate statistical analyses on complex datasets in support of company-wide project execution. Evaluation tools included determination of outliers, calculation of upper confidence limits, generation of Mann-Kendall trends, population statistics, first-rate kinetic degradation calculations, and principal components analyses. Project application included determination of outliers for purposes of delineation, evidence of secondary source(s) or co-mingled plumes, and evaluation of active natural degradation processes or successful remedial actions.

U.S. Navy, Determination of Site-Specific Background Concentrations, Multiple Locations. Calculated site-specific background concentrations of multiple analytes in soil, groundwater, and sediment using methodology successfully approved by U.S. EPA in multiple regions. Evaluation included geochemical determination of geogenic vs anthropogenic source materials using elemental ratios and geochemical regimes predict solubility profiles.

Aleris Rolled Products, Inc., Fort Hartford Superfund Site Groundwater Monitoring, Olaton, Kentucky. Prepared the approved Sampling and Analysis Plan for groundwater monitoring activities in accordance with state and federal requests.

Helena Agri-Enterprises Inc., Remedial Action Design, West Helena, Arkansas. Prepared the Quality Assurance Project Plan to address sampling related to groundwater monitoring and remedial activities under the approved Remedial Action Design Document.

The St. Joe Company, Millview Site Investigation and Remediation, Port St. Joe, Florida. Performed a series of statistical analyses to help interpret a pilot study of arsenic and polycyclic aromatic hydrocarbon (PAH) soil contamination in a residential area. Significant findings included confirmation of the representativeness of discrete sampling protocols and agreement from Florida Department of Environmental Protection (FDEP) to forgo future requirements for Incremental Sampling Methodology (ISM) sampling. Additional analyses yielded significant support to the practical design and implementation of remedial activities based on lithology-specific contaminant profiles.

B&R Auto Wrecking, Site Characterization, Corvallis, Oregon. Designed and executed soil and groundwater site characterization to delineate historic petroleum hydrocarbon release. Successfully negotiated site closure with Oregon Department of Environmental Quality based on assessment of potential receptors and lack of risk drivers without need to undertake active remediation.

Kilgore Flares Company, LLC, Part B Permit, Toone, Tennessee). Designed and implemented an air sampling program to determine the emissions profile from a series of three trial burns from the Kilgore Flares Hazardous Waste Open Burn Area as part of a successful RCRA Part B permit application. Sampling and monitoring during all three burn events included the use of Open-Path Fourier Transform Infrared Spectrometry and thermal monitoring to determine real-time chemical and thermal emissions. The third event also included collecting air samples for analysis of particulate matter, semi-volatile organic compounds, polycyclic aromatic hydrocarbons, dioxins, and furans. Findings proved that burn events do not present a risk to receptors at the existing fence lines and were used to further the application for expanded burn capabilities.

U.S. Navy, Feasibility Study Addendum, Naval Air Station (NAS) Pensacola, Florida. Analyzed geochemical data from soil and groundwater sampling program to determine the geochemical controls on plume mobility and risk to possible receptors. Findings will be used to finalize a remedial design plan for long-term treatment applicability.

U.S. Navy, Five-Year Review, NAS Pensacola, Florida. Reviewed available historical data for multiple operating units (containing multiple sites each) for technical completeness and status for the Five-Year Review report.

U.S. Army, Remedial Design and Support Services, Iowa Army Ammunition Plant, Iowa. Analyzed and interpreted site data to determine the active degradation pathways, including biotic and abiotic degradation. Using various statistical techniques, including one developed specifically for this project using principal components analyses, determined the functional correlations between Royal Demolition Explosive (RDX) and various geochemical parameters. Results were used to determine the statistically relevant analytes and reduce overall sampling costs. Designed and implemented a bench-to-pilot scale demonstration of a novel RDX remediation technology designed for aquifers not conducive to biodegradation techniques. Also drafted multiple reports and technical memoranda regarding work at the offsite plume.

U.S. Air Force, Remedial Design and Support Services, Ramstein Air Base, Germany. Analyzed and interpreted site data to determine the extent and nature of contamination at various site across the installation. In addition, calculated the volumes and extent of excavations for remediation, including the volumes of groundwater infiltration into the open excavations. Results were used to define the scope of the remediation.

Arizona Department of Environmental Quality (ADEQ), Remedial Design and Support Services, Park-Euclid Water Quality Assurance Revolving Fund Site, Arizona. Assisted on the Park-Euclid Project with researching and preparing the feasibility study for regional aquifer treatment of tetrachloroethylene (PCE) contamination. Modeled the bio- and geochemical transformations of PCE along the contamination plume as well as the 3D geologic and chemical distribution. Modeled the 3D geologic and chemical distribution of the site using CTech Mining Visualization Software and performed an uncertainty analysis to direct

further drilling activities at the site. Additionally, supervised onsite field activity and performed data management and reduction.

Shell Oil Products U.S., Remedial Design and Support Services, Arizona and Nevada. Project manager for eight leaking underground storage tank sites in Las Vegas and seven sites in Arizona. Supervised projects that included all aspects of environmental assessments and remediation at numerous gasoline retail stations. Supervised and coordinated field activities, including well design, drilling, installation, and development. Remediation experience included soil vapor extraction, groundwater air sparging, thermal and catalytic oxidation, groundwater oxygenation using hydrogen peroxide injection, and land farming of petroleum-contaminated soil. Prepared various reports, including quarterly monitoring and site characterization. Prepared permits and designs for remediation systems and performed pilot testing. Drafted deliverable reports and other documents to support ongoing field work for the client and performed numerous Risk-Based Corrective Action Tier 1 and Tier 2 analyses to move toward site closure.

Salt River Pima-Maricopa Indian Communities (SRPMIC) Feedlot Soil Sampling, Mesa, Arizona. Drafted the U.S. EPA-approved sampling and analysis plan for the site. Conducted a site evaluation at the SRPMIC feedlot, including surface soil sampling throughout the property. Soil was sampled in collaboration with representatives from SRPMIC's Cultural and Environmental Services. Samples were analyzed for pesticides.

Regulatory Compliance

Confidential Clients, Toxic Substances Control Act Section 8(a)(7) PFAS Product Evaluations. Led multiple teams providing supply chain evaluations to determine proper reporting requirements.

Confidential Client, California Proposition 65 Product Evaluations. Oversaw the testing and toxicological evaluation of multiple products distributed for sale in California to determine proper labelling requirements.

Confidential Client, Toxic Substances Control Act Product Evaluations. Provided material evaluations to determine proper reporting requirements.

California Proposition 65 Product Evaluations, Truck Pro. Oversaw the testing and toxicological evaluation of multiple products distributed for sale in California to determine proper labelling requirements.

Water and Wastewater

Arizona Department of Environmental Quality, Expedited Aquifer Protection Permit Assistance, Marana, Arizona. Researched and calculated site-specific groundwater protection levels (GPL) for hexavalent chromium (Cr [VI]) at a contaminated compressor station after thoroughly reviewing existing data for completeness. GPL calculations included considerations for aquifer characteristics, soil type, and chemical behavior/toxicity of Cr (VI). Using an evaluation of reasonable aquifer water quality standards established in other states, a GPL was calculated. The results of this effort were presented in a report to ADEQ and included all pertinent site information and chromium chemical characteristics.

International Wastewater Treatment Plant, Aquifer Protection Permit Assistance, Nogales, Arizona. Assisted with amendments to an existing Aquifer Protection Permit for a planned expansion of the International Wastewater Treatment Plant. She performed revisions to the existing permit, including long-term sampling and monitoring requirements, in coordination with the ADEQ.

Mining and Geochemistry

Confidential Client, Geochemical Modeling and Waste Characterization, Ketza River and Selius Mines, Canada. Evaluated humidity cell and shake flask data to determine the potential for acid rock drainage (ARD) and metals leaching from planned excavations. Reviewed a water quality model addressing arsenic transport within a tailings lake. In addition, provided expert opinion on future sampling and analysis to construct a representative geochemical model at a later date.

Sherritt Mine, Geochemical Modeling, Canada. Evaluated seepage water quality information to determine relevant geochemical controls on phosphate, sulfate, and trace metals concentrations. Preliminary water quality modeling efforts were conducted based on the available data to provide recommendations for future seepage management.

Agrium, Geochemical Characterization, Agrium Dry Ridge and North Husky Mines, Idaho. Served as data validation officer for the initial permitting phases for the subject properties. Drafted the U.S. EPA-approved quality assurance project plan for all characterization work, performed data validations for all x-ray fluorescence (XRF) screening data, and oversaw all data management for this complex site.

Various Clients, Geochemical Modeling, Various Locations. Served as a geochemical resource for various water production and drinking water projects, including arsenic, fluoride, and nitrate water treatment, and arsenic, benzene, toluene, ethylbenzene, and xylenes (BTEX), trichloroethene (TCE)/PCE soil contamination. Performed geochemical speciation using Visual MINTEQ and PHREEQ, including specialized equilibration, kinetic, surface sorption calculations on arsenic, chromium, iridium, cobalt, and phosphorous.

Meliadine Mine, Geochemical Modeling, Canada. Evaluated humidity cell, shake flask, and acid-base accounting data to determine the potential for ARD and metals leaching from the planned excavations. From this information, constructed a PHREEQC model to predict monthly water quality changes throughout the mine life for a complex site consisting of more than 20 open pits, two underground operations, numerous collection and seepage ponds, a tailings pond, and mill inflows.

Confidential Client Waste Characterization, Bluefish River, Canada. Evaluated site-specific mineralogy and geochemical data to calculate the ability for excavated material to leach metals if used for construction purposes.

Ministry of Transportation, Geochemical Characterization, Highway 33 Excavation, Canada. Evaluated whole rock, shake flask, and acid-base accounting data to determine the potential for ARD and metals leaching from planned excavations. This information was used to select appropriate borrow material for a series of road construction applications.

Victoria Gold Mine, Heap Detoxification Column Testing Design and Waste Characterization, Canada. Designed column testing procedures for cyanide detoxification of the heap and kinetic oxidation studies.

Barrick, Underground Sump Water Quality Modeling and Treatment), Goldstrike Gold Mine, Nevada. Performed PHREEQCI modeling to predict water quality, including dissolved metals and total dissolved solids, of treated underground water using various alternative treatment and blending scenarios.

Mactung Mine, Geochemical Modeling and Waste Characterization, Canada. Evaluated humidity cell, shake flask, and acid-base accounting data to determine the potential for ARD and metals leaching from planned excavations. From this information, constructed a PHREEQC model to predict water quality changes throughout the mine life.

Ekati Mine, Geochemical Characterization, Canada. Evaluated humidity cell, shake flask, and acid-base accounting data to determine the potential for ARD and metals leaching from planned excavations. This information was used to generate source terms for future geochemical modeling.

Gibraltar Mine, Geochemical Modeling and Pit Dewatering Design, Canada. Evaluated existing water quality data from throughout the mine property to determine a geochemically effective plan for dewatering the acidic pit water without adversely affecting the receiving water quality.

Rio Tinto, Geochemical Modeling, Rio Tinto Mine, Nevada. Calculated leaching-based site-specific limits for copper based on limited available site-specific data. Calculation outputs were used to establish target soil concentrations for remedial activities at the site.

Pogo Gold Mine, Bench-Scale Treatment Optimization, Alaska and Turquoise Ridge Gold Mine, Nevada. Performed bench-scale testing to optimize mine water treatment technologies for arsenic and other trace metals in operation at the sites.

Pebble Creek Gold Mine, Mine Water Treatment Plant Influent Water Quality Modeling, Alaska. Performed PHREEQCI modeling to predict influent water quality at the mine water treatment plant for water treatment design purposes.

City of Sedona, Effluent Infiltration Study Municipal Wastewater Treatment Plant, Arizona. Designed and implemented a sampling scheme to determine the causes of reduced wastewater effluent infiltration as observed in the area of Sedona. Collected and analyzed multiple soil samples and concluded that the reduced infiltration was because of the formation of calcite and other carbonate phases in the soil matrix.

Confidential Client, Rare-Earth Element Recovery from Coal Fly Ash, Kentucky. Performed bench-scale testing to determine the mobility and recovery of rare earth elements (REE) from coal fly ash as an economical source for domestic REE production.

Oracle Ridge Mine, Waste Characterization, Arizona. Served as waste characterization lead for mine permitting activities, including sampling and analysis of existing waste rock and tailings, as well as new material generated at the mine.

IronBark, Geochemical Modeling, Greenland. Constructed multiple geochemical models using PHREEQ for various facilities at a zinc mine in Greenland. Model outputs were used to determine the potential for ARD and total metal outputs to the Eastern River and Citronen Fjord.

Anglo Gold, Geochemical Modeling, Brazil. Constructed multiple geochemical models using PHREEQ for various facilities at a gold mine in Brazil. Model outputs were used to determine the potential for ARD based on limited available site-specific data.