PROFESSIONAL PROFILE



Michael S. Kozar, PG, LSRP, LRS

Principal Hydrogeologist

CONTACT INFORMATION
Main: (732) 584-6500
Direct: (732) 584-6546
Email: mkozar@rouxinc.com
Website: www.rouxinc.com

270 Davidson Ave, Suite 304
Somerset, NJ 08873

EDUCATION
BS, Geological Sciences, Pennsylvania State University, 1989

PROFESSIONAL LICENSES
Professional Geologist, PA No. 002577G
Licensed Site Remediation Professional, NJ No. 573988
Licensed Remediation Specialist, WV No. 474

PROFESSIONAL AFFILIATIONS
National Groundwater Association (NGWA)
Licensed Site Remediation Professionals Association (LSRPA)

EXPERIENCE SUMMARY

Michael Kozar has over thirty-five years of experience as a professional geologist providing innovative, client-focused environmental remediation solutions and multidisciplinary project management. Mr. Kozar has a background in hydrogeology and is strategic in his approach to complex environmental challenges that involve intense regulatory communications with both state and federal agencies. He has extensive experience with in situ remediation in a variety of environments and has directed Superfund programs for major industrial sites throughout Pennsylvania and New Jersey. These programs are administered by the United States Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980.

TECHNICAL SPECIALTIES

Mr. Kozar's expertise includes environmental site characterizations, soil investigations, groundwater investigations, soil remediation, groundwater remediation, and groundwater supply evaluations. He is highly skilled in the management of complex environmental investigations, natural remediation evaluations, enhanced bioremediation for hydrocarbons and chlorinated solvents in groundwater, groundwater recovery/pumping well design, performance evaluations in fractured or porous media, and subsurface remediation projects including in-situ technologies and multidisciplinary teams.

REPRESENTATIVE PROJECTS

CERCLA/Superfund

- **Centre County Kepone Site, State College, Pennsylvania, 2022–2024.** Lead hydrogeologist for groundwater remedial optimization evaluation for shutdown of pump & treat system of limestone/karst aquifer and primarily chlorinated and non-chlorinated VOCs and inferred residual source area. Mr. Kozar prepared an evaluation of MNA and in situ remedial technologies, including the use of REMChlor-MD modeling and attenuation rate derivation. MNA and in situ treatment were evaluated with respect to effectiveness on mass flux reduction and for groundwater restoration. Mr. Kozar developed a focused Groundwater Characterization Plan to better define residual source areas. He presented the optimization plan and remedial approach to USEPA and PADEP and gained regulatory support.
- **Caldwell Trucking, Superfund Site, Caldwell, New Jersey, 2017–2024.** Project Director for remedial action for groundwater to address CVOC plumes in overburden and bedrock (basalt) aquifers. Groundwater is impacted by high concentration of Trichloroethylene (TCE), Tetrachloroethylene (PCE), 1,1,1-Trichloroethane (TCA), and chloroform. Provided oversight of two Enhanced In-Situ Bioremediation (EISB) remedial programs. One program includes periodic injections of lactate. The second program includes automated groundwater extraction/collection, reinjection of lactate-amended water, seep area containment, groundwater water treatment system with a barrier wall, surface water monitoring program, groundwater monitoring programs, Vapor Intrusion (VI) programs, and regulatory reporting. Additionally, designed and implemented a fluorescent dye tracer study to evaluate groundwater flow paths/velocities and update the Conceptual Site Model (CSM).
- **Folcroft Landfill and Annex Superfund Site, OU-2 Feasibility Study (FS), Folcroft, Pennsylvania, 2018–2024.** Technical director for groundwater FS to address CVOCs/1,4-dioxane in groundwater source areas and dissolved plumes in unconsolidated formation and fractured bedrock (schist). Work includes negotiation with USEPA Region 3 RPM and Section Chief to address RI and SLERA comments; groundwater sampling; completion of Enhanced In Situ Biodegradation (EISB) and In Situ Chemical Oxidation (ISCO) treatability study; conduct

of Supplemental Cover Investigation using Multi-Increment Sampling (MIS); REMChor-MD groundwater fate & transport modeling to simulate MNA and other remedial alternatives; and completion of OU-2 (Landfill and groundwater) FS Report.

- **Henderson Road Superfund Site (USEPA Region 3), Pennsylvania.** Mr. Kozar performed technical services as part of focused feasibility study team for LNAPL/groundwater impacts in carbonate aquifer system, including hydrogeological evaluations; site characterizations; remedial alternatives/technology evaluations; and meetings with USEPA Region and other stakeholders.
- **William Dick Lagoon Superfund Site, RI/FS, West Caln, Pennsylvania, 2015–2017.** Project Director and Lead Hydrogeologist for RI/FS for groundwater CVOCs plume in fractured bedrock aquifer (quartzite) that impacted private water supply wells in rural Pennsylvania. Work included completing the delineation of CVOCs that had migrated over one mile from source area; update/revisions to the Conceptual Site Model (CSM); interim Pump and Treat (P&T) system hydraulic capture and mass removal evaluation; residential/private water supplies and Point of Entry (POET) system monitoring; Monitored Natural Attenuation (MNA)/geochemical evaluation; groundwater monitoring and CVOCs trend analysis; FS scoping; and numerous meetings with the United States Environmental Protection Agency (EPA) Region 3 (Mid-Atlantic) and Pennsylvania Department of Environmental Protection (PADEP).
- **Nassau Metals, MW Superfund Site, Former Copper Wire Recycling Facility Groundwater Remedial Design (RD), Danville, Pennsylvania.** Principal Hydrogeologist responsible for completing RD investigation required to implement Record of Decision (ROD) for several operable units. The RD included groundwater recovery and treatment for Volatile Organic Compounds (VOCs) in soil and soil stabilization. Site issues included plume in soil/fractured bedrock (limestone/shale), Dense Non-Aqueous Phase Liquid (DNAPL) in overburden, wetlands/surface water quality, waste piles, and surface soil monitoring requirements. Work included the investigation of DNAPL, overburden, and bedrock groundwater using wells, rock coring, and piezometers. Sudan IV dye screening and three-dimensional, numerical groundwater flow modeling (Visual MODFLOW) was utilized for the evaluation of groundwater-wetlands interaction and design of an overburden/bedrock groundwater recovery system. A 500-foot horizontal well was installed for groundwater extraction. Mike led all meetings and negotiations between the United States Environmental Protection Agency (EPA) Region 3 (Mid-Atlantic) and Pennsylvania Department of Environmental Protection (PADEP). He prepared workplans and reports.
- **Spectron Superfund Site, Former Solvent Recycling Facility Remedial Investigation/Risk Assessment/Feasibility Study/Remedial Design (RI/RA/FS/RD), Elkton, Maryland, 2000–2017.** Project Director/Officer and lead hydrogeologist responsible for managing multidisciplinary team to perform RI/RA/FS/RD for groundwater Operable Units. Site groundwater impacted with a suite of chlorinated/nonhalogenated volatile organic compounds (VOCs) present in soil and overburden/bedrock groundwater. Mike directed bedrock RI/FS which included well drilling, geophysical/televideo logging, packer testing, surface geophysics, hydrogeologic evaluation of stream liner/groundwater recovery and treatment system; natural attenuation assessment of chlorinated VOCs in groundwater; Dense Non-Aqueous Phase Liquid (DNAPL) evaluation in fractured bedrock (gneiss); overburden FS for in situ remediation of VOC “hot spots” in soil and groundwater; ecological and human health risk assessments; and electronic data deliverables program for historical and RI data. Completed Bedrock RI and FS reports. Work also included participation in EPA/MDE meetings and teleconferences, and technical consulting to PRP Group. As RD Contractor, completed Pre-Design Investigation (PDI) and Remedial Design Work Plans for overburden (OU-1), including In Situ Reductive Dechlorination (IRD) Treatability Study for treating DNAPL, which was approved by EPA Region III and MDE. Completed OU-1 design work included Membrane Interface Probe (MIP) and soil boring investigation to identify potential DNAPL; soil physical testing; bromide tracer test in fill/overburden soil; delineation of VOCs in groundwater; modeling of DNAPL dissolution and Remedial Time Frames (RTF) for DNAPL remedial technologies; oversight of IRD treatability study as part of RD; completed PDI/Focused FS (FFS) Report; and evaluation of potential in situ remedial technologies for DNAPL treatment. Completed Bedrock (OU-2) FS report and ROD Amendment for OU-1. Based on the OU-1 FFS, EPA changed the OU-1/DNAPL remedy to In-Situ Thermal Treatment (ISTT). Michael was the Project Officer/lead hydrogeologist for the implementation of ISTT, which was completed with EPA approval in 2017. Michael was technical lead/project officer for completion of the OU-2/Bedrock FS that included a front-end Technical Impracticability (TI) waiver for the bedrock DNAPL and dissolved VOC plume. The TI waiver was approved by EPA with the FS Report, and EPA issued an Interim Record of Decision (ROD) to allow for a final determination of whether MNA would restore groundwater for portion of VOC plume; after additional monitoring/reporting, EPA agreed to expand the TI Zone to include the dissolved VOC plume. Michael was also the Project Officer for PDI work as part of the OU-2 Remedial Design.
- **Malvern TCE Superfund Site, Remedial Design/Remedial Action (RD/RA), Chester County, Pennsylvania, 2012–2017.** Project Officer/Lead Hydrogeologist for multifaceted

groundwater Remedial Design (RD) for former solvent recycling facility, and lead scientist for soil vapor extraction (SVE)/Monitored Natural Attenuation (MNA) remedy for disposal area. Groundwater RD/remediation work included:

- Enhanced In Situ Bioremediation (EISB) microcosm study for groundwater in limestone aquifer with high (> 100 ppm) concentrations of VOCs/residual DNAPL, including TCE, 1,1,1-TCA and chloroform. Working with technical partner, Bioremediation Consulting, Inc., developed a specialized, proprietary TCE/TCA degrading culture in Site groundwater capable of the completed dechlorination of VOCs at 100 ppm. The Site microbial culture was injected successfully into site groundwater.
- Operation, maintenance, optimization and performance monitoring of EISB pilot test in bedrock aquifer, involving the injection of electron donor and nutrients and removal of groundwater; developed Technical Reports reviewed by USEPA (including Ada, OK) and PADEP. EISB in groundwater achieved the complete dechlorination of TCE to ethene, and 1,1,1-TCA to chloroethane in pilot study area.
- Groundwater VOC plume delineation in limestone bedrock for defining the DNAPL/VOC source area.
- Completion of vapor intrusion (VI) investigation of residential properties using sub-slab vapor and indoor air sampling.
- Technical reports/meetings in support of changing remedy from pumping, ex situ treatment, and reinjection to EISB (with recirculation and in situ treatment). Based on EISB pilot success, USEPA prepared an Explanation of Significant Differences (ESD) which changed the groundwater remedy from pump and ex situ treatment to EISB.
- Responsible for preparing Preliminary Design of AISB system as part of fast-track Remedial Design and construction of the full-scale AISB treatment system. Coordinated the remainder of the design: the 30%, 90% and 100% design reports. Construction/start-up phases were completed and approved by USEPA within a 16-month period.
- Technical support for SVE construction/soil VOC delineation and SVEO&M and optimization in unsaturated and perched water zones.
- MNA performance monitoring, evaluation, and reporting for bedrock aquifer.

- **Carolawn Superfund Site, Former Solvent Recovery/Waste Disposal Facility Groundwater Pump and Treat In Situ Bioremediation, Fort Lawn, South Carolina.** Project Manager responsible for remediation to site underlain by alluvium and a low-permeability bedrock aquifer (granodiorite) impacted by Chlorinated Volatile Organic Compounds (CVOCs). Groundwater pump and treat system has been operated and maintained since 1987. Performance assessment included hydraulic performance review, review of groundwater analytical data, evaluation of overall performance of the groundwater recovery/containment system, statistical analysis, and preparing reports on behalf of PRP group. Michael led a Remedial Action Optimization Study that evaluated the restoration potential and timeframe for the P&T remedy compared to alternative remedies including Monitored Natural Attenuation (MNA). Based on this evaluation and the Five-Year Review results, an In Situ Bioremediation (ISB) program was implemented. A bioremediation program was designed using 16 injection wells and a semi-soluble substrate. The groundwater pump and treat system was shutdown with EPA Region IV/SCDHEC approval for the longer-term evaluation of In Situ Biodegradation (ISB) and MNA. An FFS Report was also prepared to support the transition of the P&T remedy to MNA.
- **Woodlands 532 Superfund Site, Hydrogeologic Remedial Investigation, Burlington County, New Jersey, 1991–1993.** Responsible for performing technical services associated with subsurface hydrogeologic characterization/remedial investigation at a hazardous waste disposal site located in New Jersey Pine Barrens, under the jurisdiction of the EPA, NJDEP, and New Jersey Pinelands Commission in support of remedial evaluation/design efforts. Technical services included the characterization of widespread groundwater VOC contamination in a multi-layered sand and gravel aquifer (Cohansey Sand/Kirkwood Formation), soil investigation of potential source areas in fine-grained units, and potential presence of DNAPL. Technical hydrogeological tasks included focused soil and groundwater investigations of source and VOC plume areas, including vertical groundwater contaminant delineation using Hydropunch® sampling technique, monitoring well installation, groundwater sampling, and short duration pumping tests and analysis. Also, provided hydrogeologic, contaminant characterization and DNAPL characterization based on investigation results in support of remedial design, including characterization of three-dimensional groundwater flow utilizing flow nets and groundwater models.
- **Sayreville Landfill III Superfund Site Monitoring, Sayreville, New Jersey.** Responsible for performing landfill and groundwater monitoring, O&M and reporting programs for NPL landfill site, under the auspices of NJDEP and EPA Region II. Work includes project management, data evaluation, progress reporting and meetings. Developed CEA for groundwater that

was approved by NJDEP. Completed landfill gas assessment and contributed to the successful delisting of the site.

- **Project Manager, Dorney Road Landfill Superfund Site (USEPA Region III), Berks and Lehigh Counties, Pennsylvania.** Provided technical, hydrogeologic, and project management services for Remedial Design/Remedial Action phases for implementation of the ROD/Administrative Order for the groundwater Operable Unit. Site underlain by limestone aquifer with karst features and groundwater contaminated with chlorinated VOCs and metals. Developed the Groundwater Monitoring Plan for landfill monitoring wells and residential water supplies and for the analysis of site data and risk-based action levels. Addressed USEPA Region III comments to work plans and remedial design submittals. Managed the implementation of residential water supply monitoring events and reporting.
- **Project Scientist, Blosenski Landfill Superfund Site (USEPA Region III), Hydrogeological Investigations, Chester County, Pennsylvania.** Performed hydrogeological investigations as part of the Remedial Investigation/Feasibility Study (RI/FS) for an USEPA Region III/USACE CERCLA landfill site, underlain by fractured bedrock formation (quartzite). Hydrogeologic investigations were conducted to assess the extent of contamination by VOCs and to characterize groundwater movement and hydraulic parameters for use in numerical modeling of groundwater recovery systems; including aquifer performance testing, in situ permeability testing, and preparation of RI report.
- **Project Manager, North Penn Area 12 Superfund Site (USEPA Region III), Hydrogeologic Evaluation, Montgomery County, Pennsylvania.** Performed hydrogeologic evaluation and project management tasks as PRP representative and Remedial Design (RD) contractor for former manufacturing facility. Site is underlain by fractured, sedimentary rock aquifers and groundwater is impacted by VOCs. Served as technical representative on behalf of PRP during remedial action selection and planning stage, ROD negotiation and RD planning involving USEPA Region III.

New Jersey/LSRP

- **Confidential Client, Glass Manufacturer Remediation, New Jersey Industrial Site Recovery Act (ISRA), Cumberland County, New Jersey, 2019–Present.** Licensed Site Remediation Professional (LSRP) responsible for Remedial Design (RD) phase including pre-design investigation using sediment/soil coring, and the field screening/primary characterization and remediation of Non-Aqueous Phase Liquid (NAPLs) plus other Contaminants of Concern (COCs) such as metals, Polycyclic Aromatic Hydrocarbons (PAHs), and Polychlorinated Biphenyls (PCBs) in pond system sediment and upland soils. Based on the Conceptual Site Model (CSM), historical industrial discharges and upstream/off-site sources resulted in sediment impacts to the "losing" pond system which is part of an ephemeral stream. The scope of work included soil excavations to remediate several Areas of Concern (AOCs). Remedial action is addressing Historic Fill Material (HFM) and groundwater inorganic impacts. An Ecological Risk Assessment (ERA) will be completed to address COCs in soil and sediment. NAPL-impacted sediment removal and excavation will be conducted. Completed soil excavations to remediate several soil Areas of Concern (COCs). Remedial action is also addressing Historic Fill Material (HFM) and groundwater inorganic impacts. An Ecological Risk Assessment was completed to address COECs in soil and sediment. Project Director for Remedial Design phase including Pre-Design investigation using sediment/soil coring and NAPL field screening. Sediment removal was conducted to remove NAPL-impacted sediment and extend to NAPL-impacted soil and PCBs under USEPA TSCA Program.
- **Confidential Client, NJ ISRA, Former Glass Manufacturing Site, Cumberland County, New Jersey, 2019–2024.** Project Director and Licensed Site Remediation Professional (LSRP) for soil and groundwater Remedial Action (RA) program under NJDEP/ISRA at to address legacy Areas of Concern (AOCs) due to the primary presence of mercury in the soil. Work included a soil boring program, monitoring well installation, groundwater sampling, data trend analysis, and Monitored Natural Attenuation (MNA) evaluation. Completed Soil and Groundwater Remedial Action Workplans (RAWs), Soil Remedial Action Report and obtained Groundwater MNA RA Permit from NJDEP
- **Confidential Client, NJ ISRA, Former Solvent Storage Facility, Union County, New Jersey, 2018–2024.** Project Director and Licensed Site Remediation Professional (LSRP) for the Remedial Investigation (RI), Remedial Action (RA), and Vapor Intrusion (VI) monitoring and the delineation of on-site and off-site chlorinated solvent impacts. Based on pilot testing, Mike designed a full-scale Enhanced In-Situ Biodegradation (EISB) system utilizing horizontal injection wells to treat Chlorinated Volatile Organic Compounds (CVOCs) in glacial till and bedrock adjacent to a nearby river.
- **Confidential Metal Implements Manufacturer, Groundwater Remedial Investigation Program, Essex County, New Jersey, 2008–Present.** Project Director and Licensed Site Remediation Professional (LSRP) responsible for conducting groundwater Remedial Investigation (RI) and Industrial Site Recovery Act (ISRA) program. Groundwater was previously impacted by residual Dense Non-Aqueous Phase Liquid (DNAPL), high levels of Trichloroethylene (TCE), and other chlorinated Volatile Organic Compounds (VOCs) in 110-feet-deep glacial deposits

and underlying bedrock aquifer. RI includes saturated soil sampling, off-site deep well installations, hydraulic testing, groundwater sampling, and natural Remediation Assessment (RA). Developed the Remedial Action Selection Report (RASR) under New Jersey Administrative Code 7:26E for shallow/deep VOC plume. Conducted a successful Enhanced In Situ Biodegradation (EISB) field-scale program using lactate and bacterial consortium, and a final Remedial Action Workplan (RAWP) using EISB/natural attenuation has been conditionally approved by the New Jersey Department of Environmental Protection (NJDEP). The RAWP consists of soy-oil-based substrate and bioaugmentation EISB for source area remediation and containment; two downgradient enhanced biological active zones; and natural remediation with Classification Exception Area (CEA). Based on EISB treatment success, the project was expanded to address a newly discovered DNAPL area. Currently managing the Per-and Polyfluoroalkyl Substances (PFAS) and Vapor Intrusion (VI) investigations for on-site and off-site areas, including residential areas, in accordance with NJDEP-approved work plans. Additionally, he is overseeing the ongoing RI/RA work which includes an innovative treatability study for EISB, regional groundwater quality assessment, and delineation well installation. Completed all public notification requirements for the project thus far.

- **Confidential Client, ISRA/RCRA Remedial Investigation/Action Program, Burlington County, New Jersey, 2012–2017.** Project Director/LSRP for over $5 million in soil and groundwater Remedial Investigation (RI) and interim Remedial Action programs for resin products manufacturing facility under ISRA with over 30 Areas of Concern (AOCs). This Site is also High Priority RCRA Site. Soil and groundwater are impacted by various organic compounds, predominantly 1,2-dichloroproane (residual DNAPL), chlorobenzene/benzenes, styrene and TCE and other chlorinated VOCs; metals; sulfate and TDS. Groundwater RI activities span the water-table aquifer, confined Mount Laurel-Wenonah aquifer, and underlying Potomac-Raritan-Magothy (PRM) aquifers. RI work has included saturated soil sampling/well installations, LNAPL delineation, DNAPL/source delineation using Membrane Interface Probe (MIP) and conventional sampling in soil/shallow aquifer, hydraulic testing, groundwater sampling, and Natural Remediation assessment. Major RI/remediation tasks have included Delineation of groundwater organic plumes and surface water impacts, and refinement of Conceptual Site Model RI/delineation of soil impacts for several AOCs, including Order-of-Magnitude Analysis and addressing engineering controls/Deed Notice requirements Developed NJDEP-approved pilot testing of in situ chemical oxidation using ozone injection to treat residual source area in aquifer; performed the design (with vendor support for patented process and equipment), permitting, construction, and O&M/monitoring of ozone pilot (pilot test operation/performance monitoring are in progress). Completion of remedial alternatives analysis for DNAPL source areas/VOC plume “hot spots” resulting in NJDEP agreement with Enhanced In-Situ Bioremediation (EISB) and electrical resistance heating (ERH)/thermal-enhanced EISB approaches to source areas; utilized flow/transport modeling and future simulations (Visual MODFLOW/MT3D) for NJDEP presentation. Final Remedial Action Workplan (RAW) is pending NJDEP formal approval for EISB treatment of 1,2-DCP plume and residual DNAPL. Designed and constructed an interim groundwater extraction system for migration control of groundwater VOCs based on MIP data, hydraulic testing and numerical (Visual MODFLOW) groundwater modeling Completed soil/groundwater RI and remedial action related to diesel fuel AST release (achieved No Further Action for soil and No Further Investigation for groundwater)Completed Baseline Ecological Evaluation (BEE) Report that was approved by the NJDEP, which established ecological-based cleanup standards for primary VOC for major stream Currently completing Completed the Site-wide RI “at peril”, while implementing interim remediation; pilot remediation work; final soil delineation and Deed Notice requirements; development of Site-wide Remedial Action Workplan (RAW).
- **Tredegar Film Products, Plastic Film Manufacturing Site Groundwater Remediation, Hunterdon County, New Jersey.** Project Director and LSRP responsible for managing RI and groundwater RA program under NJDEP/ISRA for plastic films manufacturer. PCE, TCE and other chlorinated hydrocarbons impact groundwater within fractured bedrock aquifer. Work completed includes soil boring program, monitoring well installation, groundwater sampling, data trend analysis and remedial technologies feasibility study. Technical representative for NJDEP meetings/negotiations regarding case closure. Developed Classification Exception Area (CEA) for groundwater, which was approved by NJDEP. Completed highly successful HRCÒ application for in situ dechlorination of VOCs in fractured rock and achieved No Further Action (NFA) approval by NJDEP (July 2003). Currently managing the biennial CEA certifications, including groundwater sampling and CEA timeframe extension.
- **Confidential Client, Groundwater Compliance Monitoring Program, Middlesex County, New Jersey.** Project Manager and Hydrogeologist responsible for managing a program that included groundwater pump and treat program, and source remediation design as part of groundwater remedial action at former manufacturing facility under ISRA/NJDEP regulations. Groundwater pump and treat to address dissolved and DNAPL groundwater impact in the fractured rock aquifer (Passaic

Formation) by chlorinated VOCs (TCE, vinyl chloride) and Freon® compounds. Includes groundwater hydraulic and quality monitoring for on-going groundwater extraction system and monitoring well network, performance evaluations and quarterly/annual reporting to the NJDEP. A technical evaluation and field testing of an alternative, cost-effective source removal technology for controlling the DNAPL source in fractured bedrock was developed, field tested and approved by the NJDEP.

- **BumbleBee Foods, Food Processing Facility, Remedial Investigation Program, Cape May County, New Jersey.** LSRP/Project Officer in charge of completed Site Investigation/Remedial Investigation related to No. 2 Fuel Oil release. Soil and groundwater are impacted by fuel oil/hydrocarbons, including the presence of free product. Soil and groundwater SI/RI activities completed to date include soil/saturated soil sampling; monitoring well installations; LNAPL delineation and bail-down tests; hydraulic testing; groundwater sampling events; surface water monitoring; and completion of a Baseline Ecological Evaluation (BEE). Completed SI/RI as voluntary action, and the successful pilot testing/air permitting and conceptual design of Site remedy using Multi-Phase Extraction (MPE) for LNAPL/groundwater removal. Completed the RI report while retained as the LSRP.
- **Confidential Client, Manufacturing Facility Remedial Investigation Program, Warren County, New Jersey: 2010–2017.** LSRP/Project Officer/Project Manager of Remedial Investigation and Remedial Action program for valve manufacturing facility for several AOCs under an existing Memorandum of Agreement (MOA). Developed soil Remedial Action Workplan (RAW) to address metals in soil/fill. Completed NJDEP-approved Groundwater RIW and implemented RI, which included receptor survey; monitoring well installations with rock coring; groundwater sampling; evaluation of inorganic transport in bedrock; and Public Notification.
- **Confidential Client Name, Plastics Manufacturing Facility Remedial Investigation Program, Warren County, New Jersey, 2012–2017.** LSRP/Project Officer in charge/Project Manager of on-going Remedial Investigation for manufacturing facility related to impacts from mineral spirits and other organic compounds such as PCE and TCE. Assisted with the development of VI Investigation Workplan related to VOCs in soil, product, and groundwater. Project Officer for implementation of VI Investigation involving the manufacturing facility and residential properties and sub-slab vapor and indoor air sampling; the VI investigation was, and the results (no VI pathway) were approved by NJDEP. Completed RIW for complete soil and groundwater delineation. Also, completed Public Notification and CEA biennial certification requirements
- **Seton Company, Former Manufacturing Facility Remedial Investigation/Remedial Action (RI/RA), Essex County, New Jersey, 1997–2017.** Project Director/LSRP responsible for managing Remedial Investigation (RI)/Remedial Action program for active manufacturing facility in accordance with NJDEP-BUST/ISRA regulations for several Areas of Concern (AOCs), including former solvent UST impacts and MEK, MIBK, and toluene groundwater plume; No. 2/No. 6 fuel oil releases; diesel fuel UST; metals in soil and groundwater; TCE-impacted soil; and chlorinated VOCs in bedrock groundwater. RI included well installation, soil and groundwater sampling, surface geophysics, Site-wide soil gas sampling hydrocarbon degrader studies, and evaluation of geochemistry and natural remediation processes. Interim RA/completed RA include UST removal and soil excavation; product recovery; and Natural Remediation. Performed focused feasibility study of various remedial technologies. Based on geochemical study and analysis, NJDEP-BUST approved RAW for Monitored Natural Remediation for solvent AOC and CEA. Completed PA/SI/RIW for Site in 2007 as part of closure of Site under ISRA and as part of redevelopment. Current work includes completion of soil, groundwater, and soil vapor RI “at peril” and development of Remedial Action Workplan in concert with redevelopment options. Also, managed biennial CEA certifications.VI investigations are underway, pending NJDEP approval of VI Investigation Workplan. Also completing Public Notification requirements.

Pennsylvania Act 2/RCRA/Voluntary Projects

- **Confidential Client, West Virginia Department of Environmental Protection (WVDEP) Voluntary Remediation Program, Former Chemical Manufacturing Site, West Virginia Voluntary Program, South Charleston, West Virginia, 2017–2024.** Project Director and Principal Hydrogeologist for groundwater and sediment/surface water characterization on site bordered to the north by a regional river, to the south by a commercial district, to the east by chemical manufacturing operations, and to the west by residential and commercial properties. Various site investigation activities were completed to characterize the on-site and off-site impacts caused by previous operations. These impacts include CVOCs such as carbon tetrachloride, tetrachloroethene, trichloroethene, and Benzene Hexachloride (BHC) pesticide. Since 2018, the site’s bedrock has been drilled and investigated. Bedrock wells have been installed to extend the delineation of dissolved phase Contaminants of Concern (COCs) in overburden groundwater. This has allowed the environmental team to assess the extent of Dense Non-Aqueous Phase Liquids (DNAPLs) in the fine-grained unit, sand, and bedrock zone. Hydraulic testing of the bedrock wells off-site groundwater has been performed. Conducted surface water and sediment sampling to assess physical and chemical

conditions and COC levels relative to potential receptors. Collected groundwater samples in the hyporheic zone of the river to further characterize COC concentrations in the groundwater-surface water mixing zone and assess COC levels relative to receptors Evaluate fish and benthic communities adjacent to the Site as well as the potential presence of mussels, to assess community health and diversity. Evaluated groundwater discharge and groundwater-surface water mixing relative to surface water quality. Completed CSM/exposure CSMs and Human Health and Ecological Risk Assessments and completed Conceptual Remedial Alternatives evaluations and Public and agency meetings. Completed the WVDEP-approved Site Assessment Report and designed a Workplan for Mussel Toxicity Assay Testing in 2022–2024.

- **Majestic Realty, Remedial Action, Former Steel Plant Brownfields Redevelopment/RCRA and Act 2 Project, Lehigh Valley Industrial Park, Bethlehem, Pennsylvania.** Responsible for providing hydrogeological expertise for fast-track, schedule-driven RI/cleanup plan for a 500-acre former industrial site, which received approval under Act 2 and EPA Region III RCRA. Involved fast-track implementation of field program/data reporting and close coordination with PADEP and EPA. $19M estimated project cost. Act 2 Baseline/Final Report and RCRA Decision Documents were approved for Site by PADEP/US EPA Region III, and an Act 2 Release of Liability was achieved for the Site.
- **Kvaerner Naval Shipyard, Act 2 Environmental Investigation, Philadelphia, Pennsylvania.** Responsible for preparing Act 2 Baseline Environmental Investigation/Report for 114-acre former Naval shipyard facility located in Special Industrial Area (SIA). Prepared Workplan for PADEP approval and conducted site wide environmental sampling program for surface/subsurface soils, groundwater, surface water sediments, drydock seeps/discharges, and sanitary sewer discharges based on seven areas of historical shipyard manufacturing. Prepared Baseline Environmental Report summarizing environmental assessment and sampling programs to characterize the site and identify contamination and potential threats to human health and the environment. Baseline Report was approved, and an Act 2 Release of Liability was achieved for the Site.
- **RCRA Facility (USEPA Region III), Groundwater Extraction/In Situ Bioremediation, Pennsylvania.** Manager for RCRA groundwater remediation (groundwater pump & treat and in situ bioremediation) and monitoring program at site underlain by limestone bedrock. Work includes groundwater data evaluation for chlorinated VOCs and metals, statistical analysis of data, natural remediation assessments and reporting. In 2001, an Enhanced In situ Biodegradation (EISB) treatability study was successfully conducted using laboratory microcosms, various electron doners and a bacterial consortium, to reductively dechlorinate TCE and other VOCs. The EISB field-scale treatment was approved by the USEPA/PADEP and implemented in 2003. The EISB system design includes bedrock injection wells; geophysical logging; packer testing; the continuous injection of ethanol; subsequent injection of bacteria consortium and edible oil substrate (Newman Zone); and performance monitoring. Based on the success of EISB in the treatment area, EISB was expanded to another source area using sodium lactate addition with USEPA/PADEP approval. Currently continuing O&M/groundwater monitoring of the pump & treat system under RCRA.
- **Lead Hydrogeologist, Former Railcar Manufacturing Facility, Act 2 Hydrogeologic Study, Philadelphia, Pennsylvania.** Supervised and implemented various phases of hydrogeologic characterization, groundwater remedial action and Act 2/Redevelopment Project for 200 acre industrial facility, including: groundwater monitoring programs; packer testing and aquifer performance testing and analysis; VOC plume definition programs; recovery well design, installation and testing; analytical and numerical modeling (FLOWPATH) of hydrogeological system under regional and pumping conditions; calibration to aquifer performance tests; evaluation of hydraulic capture/remedial timeframes; analytical transport modeling (PRINCE); statistical analysis of groundwater elevation data; SVE and air sparge pilot system design, testing and analysis; PADEP and DRBC interfacing and permitting; and preparation of work plans, sampling and analysis plans, health and safety plans, progress reports and final reports. The Act 2 RI/Final Report was approved by PADEP, an Act 2 Release of Liability was achieved for the Site, and the Site has been successfully developed into a new golf course in Montgomery County.
- **Project Leader, Metal Pigments Manufacturing Facility, Act 2 and CAP Regulations Program, Carbon County.** Project Officer and Technical Lead for Act 2 and Corrective Action Process (CAP) programs for active manufacturing site. The areas of concern include: TCE-impacted soil and groundwater with potential dense non-aqueous phase liquid (DNAPL) present in groundwater; No. 6 fuel oil LNAPL area; and varsol solvent impacted area related to regulated ASTs. Initially, PADEP notified the client that a Consent Order was forthcoming; however, Project Lead successfully negotiated with PADEP to move site into Act 2/voluntary cleanup program. Completed work includes:
    - Soil boring advancement/soil sampling
    - Overburden and bedrock well installation
    - Downhole geophysical/televideo logging

- Surface geophysics
- Numerous groundwater monitoring events
- LNAPL delineation, characterization and on-going removal
- Groundwater seep collection and on-site treatment to remove TCE
- Site Characterization/Remedial Action Plan for solvent AST release per the CAP regulations (PADEP-approved documents)
- Implementation of solvent AST remediation to demonstrate attainment of Statewide Health Standard for groundwater
- Ecological screening
- Act 2 submissions
- Quarterly Progress Reports

Current work includes the analysis of remedial alternatives and pilot testing to address the TCE source in soil/groundwater and completion of the bedrock portion of the RI.

- **Manager, Former Manufacturing Facility, Act 2 Philadelphia, Pennsylvania.** Managed Act 2 RI/Final Report project for former manufacturing site to address VOCs, PAHs (hydrocarbons) and metals contamination in soil and groundwater. Performed soil and groundwater fate and transport modeling to support a Site-Specific Standards (numerical standards and no exposure pathway standard). Based on Act 2 RI/Final Report, no further remediation was required, and the Act 2 Final Report was approved by PADEP, and a Release of Liability was achieved for the Site.
- **Manager, Industrial Corporate Center, Act 2 Soil and Groundwater Investigation, Montgomery County, Pennsylvania.** Managed Act 2 project involving soil and groundwater investigation at light industrial facility. Work included soil borings/well installation, groundwater sampling and reporting. Current activities include completion of Site Characterization Report and Act 2 Final Report. The PADEP approved the Site Characterization Report and Act 2 Final Report for groundwater/soil and an Act 2 Release of Liability was achieved for the Site.
- **Manager, Perkasie Borough, Act 2 Redevelopment Project, Perkasie Borough, Pennsylvania**. Managed Act 2/redevelopment project for municipal parking lot, involving the presence of heavy metals and hydrocarbons in soil. Work included meetings/negotiations with PADEP-Cleanup Program and Waste Management, as well as public meeting. Completed the Act 2 Final Report which was approved by the PADEP, and a Release of Liability was achieved for Site soil.
- **Former Engine Parts Manufacturer, Act 2 Remediation, Philadelphia, Pennsylvania.** Managed Act 2 remediation for manufacturing facility under a Site-Specific Standard Cleanup Option for soil and groundwater. The Cleanup Plan was prepared, remedial construction was completed, and the Final Report was completed. Regulated substances included metals, VOCs and SVOCs. The cleanup included demonstration of a no exposure pathway, asphalt cap construction, and engineering/institutional controls. PADEP approved the Cleanup Plan and Act 2 Final Report and granted a Release of Liability for soil and groundwater.
- **Manager, Valve Manufacturer, Act 2 Investigation and Cleanup, Lancaster County, Pennsylvania.** Conducted Phase I/II and Act 2 investigation and cleanup at manufacturing facility, to address the presence of petroleum hydrocarbons in soil in several AOCs. Work included interior/exterior soil borings, groundwater investigation, soil excavation and integration with new concrete pads/storage buildings. The Act 2 Final Report was approved by the PADEP, and a Release of Liability was granted for soil.
- **Technical Manager, Pharmaceutical Manufacturer, Act 2 Remedial Investigation and Cleanup, Lancaster County, Pennsylvania.** Managed Act 2 remedial investigation at large pharmaceutical plant. Scope of activities included soil and groundwater investigation, bedrock drilling, disposal area investigation and receptor surveys.
- **Manager, Steel Tube Manufacturing Facility, Act 2/RCRA (USEPA Region III), Hydrogeologic/Site Characterization, Chester County, Pennsylvania.** Performed hydrogeologic/site characterization for steel manufacturing facility with chlorinated VOC and DNAPL contamination in fractured limestone and schist aquifers. Services include site characterization/remedial action reporting, conceptual design of groundwater pumping system for containment of DNAPL zone and VOC plume, development of groundwater Cleanup Plan, and PADEP/USEPA meetings and negotiations, including both RCRA and Act 2 concerns.
- **Project Manager, Confidential Industrial Facility, LNAPL Recovery Efforts, Philadelphia, Pennsylvania.** Supervised monthly product (LNAPL) recovery efforts in site monitoring wells utilizing passive recovery methods associated with solvent and petroleum releases from USTs, paint storage and transfer lines, at a light manufacturing facility. Included an assessment of soil vapor, soil, and groundwater contaminant concentrations, and the presence of DNAPL and preliminary evaluation of product recovery technologies.
- **Project Scientist, State University, UST Closure, Monroe County, Pennsylvania.** Supervised UST closure, Site Characterization and Feasibility Study associated with

regulated, leaking gasoline UST at State University. Site is underlain by glacial deposits and fractured, shale aquifer. Tasks included chairing job conferences, contract administration, soil and groundwater quality assessment, closure report review, client meetings and DER (PADEP) interfacing. Managed and performed site characterization of subsurface soil, LNAPL and groundwater in order to characterize the nature, extent, concentration and migration of BTEX and other petroleum hydrocarbon compounds. Site Characterization included ground penetrating radar (GPR), soil borings, monitoring well installation, groundwater sampling, plume delineation, migration assessment and hydraulic testing.

- **Project Manager, Fuel Transfer Facility, LNAPL Recovery/Monitoring, Northampton County, Pennsylvania.** Managed and performed site assessment and groundwater and LNAPL recovery/monitoring program for fuel storage and transfer terminal related to the presence of soil, non-aqueous phase and dissolved groundwater contamination by petroleum hydrocarbons. Site is underlain by limestone/dolomite bedrock aquifer. Tasks included an assessment of historical data, hydrogeological characterization, groundwater monitoring, product recovery plan, comprehensive background assessment and file review, and client/DER correspondence and meetings.
- **Manager, Multiple Facilities, Phase I and II Investigations, Lancaster County, Pennsylvania.** Conducted Phase I and Phase II investigation for 4 active or former industrial facilities as part of fast-track property transaction. Work included comprehensive Phase I assessments/audits, identification of Areas of Concern (AOCs), and invasive soil and groundwater investigations. Work was completed within allotted schedule and the transaction was completed.
- **Project Scientist, Metals Supplier, Hydrogeological Investigations, Lancaster County, Pennsylvania.** Provided technical work plans for hydrogeological investigations and assessment of soil, surface water and groundwater quality at metal processing/refining facility as part of DER (PADEP) Consent Order and Agreement, including field investigation plans, sampling and analysis plans and client/legal counsel meetings.

PROFESSIONAL TRAININGS

OSHA 40-Hour

Intensive Executive Development Workshop, Florida Association of Recovery Residences (FARR)

Groundwater Pollution and Hydrogeology PC Applications, IBM

Modeling of Groundwater Flow and Pollution, University of Cincinnati

USGS Modular Flow Model (MODFLOW) for Simulation of Groundwater Flow and Advective Transport, National Groundwater Association (NGWA)

National Attenuation of Chlorinated Solvents in Groundwater, Bioremediation of Chlorinated Solvent Consortium, Remediation Technologies Development Forum (RTDF)

Accelerated Bioremediation of Chlorinated Solvents, Bioremediation of Chlorinated Solvent Consortium, Remediation Technologies Development Forum (RTDF)

Site Remediation Basic, Office of Continuing Professional Education, Rutgers University

Dense Nonaqueous-Phase Liquid (DNAPL) Remediation Decision-Making Based on Cost-Risk-Benefit Analysis, Battelle Memorial Institute

Practical Models Supporting Remediation of Chlorinated Solvents, Savannah River National Laboratory (SRNL), Center for Sustainable Groundwater and Soil Solutions (CSGSS)

Biogeochemical Reductive Dechlorination of Chlorinated Solvents and Metal, Battelle Memorial Institute

PUBLICATIONS

EVO/Bioaugmentation for Treatment of TCE by Biobarrier and Source Injection Approach," presented at the Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies, Miami, Florida. May 2017.

"More Than a Decade of Challenges and Success: Enhanced In-Situ Reductive Dechlorination of TCE/1,1,1-TCA Source Area in Fractured Bedrock," presented at the Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies, Miami, Florida. May 2017.

"Five Years of Progress and Challenges: Enhanced In-Situ Reductive Dechlorination of TCE/1,1,1-TCA Source Area in Fractured Bedrock," presented at the 11th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, California. May 2017.

"Five Years of Progress and Challenges: Enhanced In-Situ Reductive Dechlorination of TCE/1,1,1-TCA Source Area in Fractured Bedrock," presented at the 11th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterrey, California. May 2016.

"Laboratory Treatability Studies to Assess Degradation/Transformation Processes for 1,2-Dichloropropane," presented at the Third International Symposium on Bioremediation and Sustainable Environmental Technologies, Miami, Florida. May 2015.

"Laboratory Treatability Study to Assess the Aerobic Biodegradation Process for Propylene," presented at the Third International Symposium on Bioremediation and Sustainable Environmental Technologies, Miami, Florida. May 2015.

"Optimization and Lessons Learned: Biocirculation to Enhance Degradation of Trichloroethene/1,1,1-Trichlroethane in Fractured Bedrock," presented at the Third International Symposium on Bioremediation and Sustainable Environmental Technologies, Miami, Florida. May 2015.

"EISB Treatment of Chlorinated VOCs by Biobarrier and Source Approach," presented at the Third International Symposium on Bioremediation and Sustainable Environmental Technologies, Miami, Florida. May 2015.

"Sustaining Field-Scale Biodegradation and Enhanced Attenuation of Trichloroethene/1,1,1-Trichloroethane Under Challenging Groundwater Flow Conditions," presented at the 10th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterrey, California. May 2014.

"Enhanced Degradation of Trichloroethene and 1,1,1-Trichloroethane in Fractured Rock Utilizing a Recirculation System," presented at the 9th International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterrey, CA. May 2012.

"Biodegradation of High 1,2-Dichloropropane Concentrations in Microcosms Containing Dehalococcoides and Dehalobacter Organisms," presented at the 10th International Conference on In-Situ and On-Site Bioremediation, Baltimore, Maryland. May 2009.

"The Importance of pH in Reductive Dechlorination of Chlorinated Solvents," presented at the 10th International Conference on In Situ and On-Site Bioremediation, Baltimore, Maryland. May 2009.

"Ethanol Biostimulation and Bioaugmentation of VOC-Impacted Deed Bedrock Aquifer," presented at the Fifth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterrey, California. May 2004.

"Enhanced Degradation of Chlorinated Solvents in Fractured Rock Groundwater Using Subsurface Injection of HRC®", proceedings Paper, Third International Conference on Remediation of Chlorinated and Recalcitrant Compounds, May 2002.