PROFESSIONAL PROFILE

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EDUCATION
BS, Civil Engineering, Temple University, 2014

PROFESSIONAL LICENSES
Licensed Professional Engineer in New Jersey
Licensed Site Remediation Professional (LSRP)

James Kazanjian, PE, LSRP

Principal Engineer

EXPERIENCE SUMMARY
Thirteen years of environmental and civil engineering experience in: development, design and implementation soil and groundwater remediation using numerous remedial technologies; preparation remedial options analysis, feasibility studies and remedial cost estimating; facility decommissioning including removal and remediation of underground storage tanks (USTs), asbestos and facility demolition.

TECHNICAL SPECIALTIES
Engineering specialties include remedial design, permitting, and construction; remedial options/alternatives analysis and cost estimating for various engineering technologies; in situ chemical oxidation/reduction (ISCO/ISCR) injection project design for pilot testing and full-scale applications; UST investigative and closure support including field oversight, sampling, and reporting; and field oversight of large constructions events.

REPRESENTATIVE PROJECTS

In Situ Groundwater Treatment

- Design Engineer and Project Manager for the remediation of dissolved phase 1,4-dioxane and trichloroethene (TCE) at a former manufacturing facility in Belleville, New Jersey. The full-scale program involved the injection of over 472,000 gallons of modified fenton's reagent and sodium persulfate amendment solution, and over 290,000 gallons of zero valent iron (ZVI) amendment solution. Modified Fenton's reagent and sodium persulfate amendment solution was utilized to target areas exhibited dissolved phase concentrations of 1,4-dioxane in excess of 20 micrograms per liter (µg/l) and ZVI amendment solution was utilized to target TCE concentrations greater than 100 µg/l where 1,4-dioxane was not present above 20 µg/l. Project was completed within a 9-month (design and implementation) window in order to meet the developer's construction schedule to build a warehouse within the greater New York Metropolitan area. Post-injection performance monitoring is ongoing; however, initial post-injection data identifies positive indicators that the remedy was effective at achieving project specific goals.

- Design Engineer and Project Manager for the remediation of dissolved phase benzene at a former manufacturing facility in Ewing Township, New Jersey. The pilot-study program involved the injection of 10,000 gallons of sodium persulfate amendment solution. The sodium persulfate amendment solution was utilized to target areas exhibiting dissolved phase concentrations of benzene in excess of 10,000 µg/l. The project is currently in the performance monitoring phase; however, performance monitoring data has identified an 83% reduction in groundwater concentrations when compared to baseline. Additional performance monitoring sampling will be implemented to evaluate the longevity of the amendment in the subsurface and to monitor the rebound of dissolved phase benzene. Following the evaluation period, a full-scale injection program will commence to address the remaining areas of the groundwater plume.

- Support Engineer and Field Implementation Lead for the design of a treatability study for the remediation of TCE and dichloroethene (DCE) at a former compressed gas facility in Florence, South Carolina through the United States Environmental Protection Administration (EPA) Resource Conservation and Recovery Act (RCRA) program implemented through the South Carolina Department of Health and Environmental Control (SCDHEC). The pilot-study involved the injection of over 200,000 pounds of ZVI to abiotically degrade chlorinated solvents.

Certain injection locations also received emulsified vegetable oil (EVO) to stimulate the indigenous microbial community in an effort to increase the rate of TCE and DCE degradation and to treat low levels of 1,1,1-trichloroethane (TCA). Design engineer for Phase II ZVI injections to remediate groundwater downgradient of the source plume and to mitigate off-site migration of contaminants of concern (COC). Post-injection performance monitoring validates effectiveness of implemented remedy and supports implementing a long term monitored natural attenuation (MNA) remedy.

- Support Engineer for the design of a pilot study injection program for the remediation of xylenes at a paint manufacturing facility located in Newark, New Jersey. The pilot study involved the injection of three different bioremediation amendment types at three separate areas across the Site's plume. The objective of the pilot study was to identify which amendment type would be most effectives at remediating COCs absorbed to soils and dissolved in groundwater. Following the initial performance monitoring program, the final amendment type (combination of petroleum degrading bacterial culture, and carbon, nitrogen and phosphorus) was selected to be injected through additional hot-spot injections across the plume's source area. The performance monitoring dataset generated from supplemental injections identified that although indications of remedial activity were present, the amendment was "washing" COCs from the soil matrix into the groundwater. As such, the use of a dissolved oxygen in situ treatment (DO-IT) system was designed and installed to 1) provide oxygen near its saturation point (>35 ppm); 2) promote and maintain COC-degrading biological activity; and 3) eliminate the potential for COCs to migrate to offsite properties.
- Support Engineer for the design of a pilot study injection program for the remediation of light, non-aqueous phase liquid (LNAPL) and extractable petroleum hydrocarbon (EPH) contamination in soil resulting from a former heating oil tank release former industrial Site located in Newark, New Jersey. The pilot study involved the injection of petroleum consuming bacterial cultures across the area most heavily impacted with EPH within the saturated zone and at areas identified to have largest volume of LNAPL. The objective of the pilot study was to reduce EPH detections to concentrations below the New Jersey Department of Environmental Protections (NJDEP) Residential Soil Remediation Criteria (RSRC) and to eliminate the presence of LNAPL. Post injection performance soil sampling results have identified that EPH concentrations have reduced to below the RSRC and the presence of LNAPL has been eliminated from the Site.
- Field Lead for the implementation of a treatability study to evaluate the feasibility of TCE bioremediation at a former stainless-steel tube manufacturer using molasses, a low-cost carbon source. TCE was detected at concentrations in excess of 700 milligrams per liter (mg/l) and extended from the overburden into fractured bedrock at depths greater than 300-feet below ground surface (bgs). The treatability testing was designed to evaluate the effectiveness of molasses injections and determine if bioremediation is an effective remedial approach for TCE degradation at the detected concentrations. The results of the treatability study identified that bioremediation is effective at degrading TCE at the Site; however, the overburden proved difficult to treat due to the underlying fractured bedrock allowing downward migration of injected amendments. Future pilot-studies are warranted to improve upon the distribution of molasses within the overburden while minimizing discharge into the fractured bedrock.
- Support Engineer and Field Lead for an ammonium nitrate pilot study to remediate 1,2-dichlorobenzene (1,2-DCB) located within glacial till/weathered bedrock. Ammonium nitrate was selected based on 1) aerobic degradation pathway of 1,2-DCB; 2) high water solubility when compared to oxygen; and 3) low cost of the amendment. The small-scale pilot-study was successful in degrading 1,2-DCB below the NJDEP Groundwater Quality Standards (GWQS) within the injection area. Consequently, a full-scale remediation was designed and implemented in Spring 2016 using pneumatic fracturing techniques. Ammonium nitrate injections using pneumatic fracturing techniques allowed for a larger radius-of-influence (ROI) by reducing the injection points and fracturing the subsurface to promote amendment migration and contact with contaminated soils.
- Design Engineer and Field Lead for the implementation of a full-scale injection program to remediate tetrachloroethene (PCE) exceedances at an industrial facility located in Vineland, New Jersey. The full-scale injection activities utilized a carbon source injection amendment combined with the emplacement of a bacterial culture and a bacterial food source. The amendment was emplaced as a "trap and treat" remedy for COCs to absorb to the carbon source and once absorbed, the naturally occurring and emplaced bacteria cultures would utilize the COCs as a food source resulting in the degradation of PCE to less harmful by-products (e.g., methane, ethane, ethene, carbon dioxide, etc.). The results of the full-scale injections proved that bioremediation is effective at degrading PCE at the Site. Two supplemental, hot-spot injection programs were implemented within the source area to expediate the remediation process. The Site is currently in the groundwater performance monitoring phase, and it is anticipated that MNA will be selected as a final groundwater remedy to address the low-level COC concentrations across the plume.

- Lead Design Engineer for in situ injections at an Irvington, New Jersey commercial facility to remediate VOCs located within glacial till using sodium percarbonate. Duties included injection design and coordination with subcontractors. Prepared a Permit-By-Rule and Remedial Action Workplan that was submitted to and approved by the NJDEP. Plan included monthly ISCO injections for treatment of VOCs contamination and expanded groundwater monitoring plan. Injection successfully remediated VOC concentrations within Site monitoring wells and within source area soils. The Site is currently in the groundwater performance monitoring phase, and it is anticipated that MNA will be selected as a final groundwater remedy to address the low-level COC concentrations across the plume.
- Design Engineer for the implementation of a bench test aimed to reduce hexavalent chromium to trivalent chromium via the use of sodium lactate. Work activities included the design of the bench study parameters, implementation and testing of sodium lactate's effectiveness on the capacity to reduce hexavalent chromium to trivalent chromium and completion of bench study summary report. Findings concluded that sodium lactate is effective at reducing hexavalent chromium to trivalent chromium. Dataset was utilized to design a pilot study injection program.

General Remedial Engineering Projects

- Design Engineer to investigate and remediate cadmium contaminated soil and groundwater at a former industrial manufacturing facility in Franklin Township, New Jersey. Cadmium at hazardous and non-hazardous concentrations was present within a 14-foot deep sub-grade competent concrete structure that was historically used as an industrial waste and utility corridor during industrial operation dating back to the early 19th century. The goal of the remediation approach was to excavate the presence of all soil and debris contained within the tunnel for off-site disposal. Once all soil was removed from the tunnel system (3,000 non-hazardous tons and 400 hazardous tons), the tunnel walls and floor were power washed, the excess liquids were removed, and the tunnel floor was perforated to allow for stormwater infiltration. Following perforation, five sub-grade stormwater vaults and associated 36-inch perforated ADS piping were installed to convert the tunnel system into a combination stormwater infiltration/conveyance system. Project involved completing continuous community air monitoring throughout the duration of all earthwork.
- Design Engineering to investigation and remediate benzene contaminated soil and groundwater at a former industrial facility in Ewing Township, New Jersey. Benzene at concentrations in excess of the NJDEP's Non-Residential Soil Remediation Standard (SRS) was present underneath a building structure. The goal of the remediation approach was to remove the soil source area located underneath the building and following removal, emplacing sodium persulfate in the base of the excavation area to promote contaminant destruction at areas where excavation could not be completed. Petroleum impacted soils were excavated to depths ranging from 5- to 8-feet bgs across an approximate 2,500 square foot area and approximately 800 tons of petroleum impacted soils were disposed of as non-hazardous material. In addition, approximately 30 helical pier structure supports were installed along the perimeter foundation and at main support columns to ensure the structure integrity of the building was sufficiently supported throughout the excavation work. Following disposal work, approximately 12,000 pounds of ISCO amendment was mixed into the base of the excavation at depths ranging from 8- to 11-feet bgs.
- Design Engineer to investigation and remediate petroleum contaminated soil and LNAPL at a former industrial facility in Bayonne, New Jersey. Extractable petroleum hydrocarbons (EPH) in excess of the NJDEP's Free Product Limit were present at an isolated area of concern at the Site. The goal of the remediation is to encapsulate and solidify contaminants within a concrete matrix and prevent any potential remobilization of contamination desorbing from the soil matrix into the groundwater table. In order to properly design and implement ISS, a Site-specific bench study was completed to establish and confirm the ISS feasibility, and to identify a mix design capable of achieving project specific goals. The bench study evaluated ten different ISS reagent dosages, of which, it was determined that a reagent dosage of 4.5% by weight of portland cement and 4.5% by weight of blast furnace slag met the project specific criteria. The in situ soil stabilization treatment area encompassed ~11,000 square feet and extends from 2-feet bgs to 10-feet bgs. Following completion of the mixing activities, post-remediation samples were collected for unconfined compressive strength analysis, permeability analysis and leachate analysis. All sample results passed their respective metrics and the presence of LNAPL was eliminated.
- Design Engineer to investigate and remediate polyfluoroalkyl substances (PFAS) contaminated soil and groundwater at a former manufacturing facility in Belleville, New Jersey. As soil screening levels, soil standards and impact-to-groundwater (IGW) standards had not yet been established for PFOA or PFOS by the NJDEP or United States Environmental Protection Agency (EPA) at the time of the investigation, an evaluation of regional and state approved PFAS soil screening levels and standards around the country was conducted. To provide a conservative approach, the San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels (SFWCB ESLs) for Direct Exposure Human Health Risk Levels were

selected as the remedial criteria for completion of the PFAS remediation. Furthermore, Site-specific IGW standards were calculated using the Synthetic Precipitation Leaching Procedure (SPLP) analyses for PFOA and PFOS. A technical consultation between Roux and the NJDEP was conducted in March 2021 to confirm the applicability of this approach. The approach and methods utilized were deemed acceptable by the NJDEP and were memorialized in Roux's Interim Remedial Measure / Remedial Action Work Plan. Using the NJDEP's approved compliance averaging tools, the proposed plan included the remediation of an area that encompassed approximately 24,000 square feet and ranged from depths of 5-feet to 10 feet bgs. The goal of the excavation approach was to remove PFAS-contaminated soil to reduce the spatially weighted concentration to below the Non-Residential Soil Remediation Standard. Remediation was completed to excavate and complete off-site disposal of approximately 12,372 tons of soil. No post-excavation soil samples were required to be collected; however, Roux performance monitoring groundwater data has identified that the source material has been removed, and groundwater concentrations have been reduced by several orders of magnitude when compared to pre-excavation concentrations.

- Project Engineer for preparation of a feasibility study workplan for the evaluation of remedial alternatives at a former stainless-steel tube manufacturing facility. Activities included performing preliminary screening to retain and dismiss remedial process options based on implementability, effectiveness and cost. Evaluated remedial alternatives for in situ injection options (i.e., ERD, ISCO and ISCR) and hydraulic control to treat CVOCs and metals.
- Project Engineer for immediate environmental concern (IEC) of commercial property in residential area for elevated mercury vapors. Followed appropriate, strict NJDEP regulations for reporting aspects of the IEC. Communicated with current property owner, property owner's legal counsel, property owner insurance, and insurance party's environmental consultant for fluid project progress. Investigated the source and extent of mercury vapors in the building's crawl space. Implemented the excavation of the source soils in the crawl space in NJDEP's source removal time frame of one year. Worked with a structural engineer to install temporary and permanent supports to adequately support the building during excavation activities.
- Design Engineer and Project Manager for an excavation of petroleum impacted soils in Englewood, New Jersey. Excavation was successfully completed to a depth of 10-feet bgs. Through remedial activities, 1,700 tons of petroleum impacted soil and over 440,000 gallons of petroleum impacted groundwater were removed from the Site's source area. Excavation was completed under a vacant building and the building's foundation was supported with steel helical piers. Remedial activities were selected to remove source area contamination from saturated soils to remediate groundwater. Groundwater concentrations have attained the groundwater quality standard, and a no further action determination was issued in July 2023.
- Design Engineer and construction oversight of excavation of petroleum impacted soils in Irvington, New Jersey. Excavation was successfully completed to a depth of 15 feet bgs. Through remedial activities one 5,000-gallon waste oil tank, one 550-gallon gasoline tank, 925 tons of petroleum impacted soil and over 10,000 gallons of petroleum impacted groundwater were removed from the Site's source area. Additional field activities included completion of daily field reports, inspections to confirm compliance with specifications and photo documentation. Remedial activities were selected to remove source mass from saturated soils to remediate groundwater. Following the implementation of the remedy, groundwater was monitored and an Unrestricted Use Response Action Outcome was issued in May 2019.
- Construction oversight of excavation of petroleum impacted soils in Woodcliff Lake, New Jersey. Excavation was successfully completed to a depth of 12-feet bgs. Through soil disposal, 350 tons of petroleum impacted soil was remediated from the area. Completed soil delineation and temporary well installation for sample collection. Additional field activities included completion of daily field reports, inspections to confirm compliance with specifications and photo documentation. Remedial activities were selected to remove source area from saturated soils to remediate groundwater. Following the implementation of the remedy, groundwater concentrations attenuated to below the NJDEP GWQS. The Site received an Unrestricted Use Response Action Outcome in the Winter of 2018.
- Design Engineer of sub-slab depressurization systems to facilitate the elimination of vapor intrusion to residential housing, commercial buildings and industrial facilities. Activities include the design, installation, performance monitoring, and operation and maintenance of systems to ensure that they are operating as designed.
- Field Lead on a full-scale soil vapor extraction / air sparge (SVE/AS) system at a Vineland, New Jersey industrial facility. Duties included project set-up, coordination with subcontractors, the collection of field verification parameters and interpretation of results. Prepared and submitted system O&M reports. Field tasks included field gauging and system operation and maintenance. Completion of a cost/benefit analysis for transferring system to granular activated carbon

units. Knowledge of SVE programming procedures and system trouble shooting techniques were gained by conducting periodical field events.

- Field support of active large-scale petroleum facilities. Participated in the investigations of 150 open spill cases associated with historical releases of unleaded/leaded gasoline, diesel fuel, kerosene/jet fuel and Transmix throughout the site. Work activities included order of magnitude cost estimating for Site closure of all 150 spill cases, soil and groundwater investigation, design of select remedial actions to be implemented in specific spill areas and client communication.
- Preparation of technical report regarding UST and SPCC compliance updates for clients in the chemical industry. The plans were prepared to evaluate the client's level of compliance in accordance with the Federal Oil Pollution Prevention Regulation, Title 40 Code of Federal Regulations (40 CFR 112). Tasks conducted include site inspections and documentation culminating in report preparation and submittal.
- Field Lead for groundwater monitoring and soil investigation activities at various projects in southern, central, and northern New Jersey. Responsibilities included coordination with laboratory and equipment companies, oversight of drilling, installation of monitoring wells, collection of soil and groundwater samples, and management of other field personnel.
- Field support for completing soil investigation which included installation of soil borings, field classification of soils, sample collection and chain-of-custody procedures, and horizontal and vertical delineation of impact to determine plume size and direction at an active Industrial facility. Coordinated with the facility manager to complete the proposed scope of work while not interrupting the facilities day-to-day operations.
- Engineering support for the abandonment of a former wastewater treatment plant's storage lagoon area. Work included implementation of construction activities to be completed to specification, construction oversight, client communication, project updates to field project team and client, and coordination with contractors to adapt to changes based on field conditions.

PROFESSIONAL TRAININGS

40-hour OSHA Health and Safety Training

Transportation Worker Identification Credential (TWIC)