



PROFESSIONAL PROFILE



Michael Lesakowski

Vice President | Principal Scientist | Co-Operations Manager

EXPERIENCE SUMMARY

Over twenty-five years professional experience in environmental engineering, science, and consulting at numerous contaminated sites throughout the northeast United States as Vice President (Roux Environmental Engineering and Geology, DPC), President, Principal Scientist, Sr. Project Manager and Project Manager (TurnKey Environmental Restoration, LLC), Executive Vice President, Project Manager and Environmental Scientist (LCS, Inc.) and Environmental Scientist (GZA GeoEnvironmental of NY).

TECHNICAL SPECIALTIES

Expert in all aspects of the New York Brownfield Cleanup Program, including technical assessment and analysis of the site investigation/remedy selection process, and site remediation. Expert in the business of the NY BCP sites, including cost/credit analysis and structured liability transfers of contaminated properties. Mr. Lesakowski has investigated and remediated over 100 NY brownfield projects, including 10 renewable energy redevelopment projects on remediated brownfield sites. He has managed assessments, investigations and remediation projects on properties with a multitude of historic uses (e.g., petroleum storage refineries and terminals, gas stations, automobile dealerships, rail yards, foundries, dry cleaners, steel manufacturing, metallurgical plants, metal plating operations, junk yards), media types (surface and subsurface soil, groundwater, sediments, soil vapor, indoor air, building materials) and contaminants (e.g., volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), heavy metals, per- and polyfluoroalkyl substances (PFAS)). Mr. Lesakowski has managed remediation projects, ranging from simple underground storage tank (UST) removals to large-scale soil excavations, in-situ soil stabilization, and complex groundwater remediation programs, such as biological and/or chemical in-situ groundwater treatment and permeable reactive barriers for VOCs and PFAS.

REPRESENTATIVE PROJECTS

GLR Holdings Site, Niagara Falls, New York

Manager and Principal Investigator/Remediator for Remedial Investigation (RI), Interim Remedial Measure (IRM) and Remedial Alternatives Analysis under the NYSDEC guidance for a former automotive repair facility with significant soil, groundwater and soil vapor chlorinated volatile organic compounds impact. The RI included a hydrogeologic assessment, including soil borings using a hollow stem auger drill rig, installation, development and sampling of groundwater monitoring wells, an on-site and off-site soil vapor assessment and dye test to trace drains and sewers to evaluate potential preferential pathways. The remediation approach included:

- Soil excavation and disposal.
- In situ enhanced biodegradation of groundwater.
- The newly constructed building included an active subslab depressurization system to protect the occupants from potential soil vapor intrusion.

The site was redeveloped as a restaurant.

Seneca Market I, LLC Site, Watkins Glen, New York

Manager of Site Investigation and Remediation at a former drycleaner, bus garage and asphalt plant under NYSDEC guidance with significant chlorinated volatile organic compounds impact. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling. The remediation approach involved:

- Underground storage tank removal;
- In-ground hydraulic lift removal;

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EDUCATION

MS, Environmental Engineering
Science, University at Buffalo,
2008
BS, Biology, State University of
New York at Fredonia, 1994

- Hazardous soil excavation and disposal proximate a commercial building;
- Enhanced biodegradation of groundwater;
- Groundwater extracted during excavation was treated with granular activated carbon and discharged to the municipal sewer system
- An active sub-slab depressurization system to protect the occupants from potential soil vapor intrusion; and
- Portions of the site included an engineered soil cover system.

The Property was redeveloped with an up-scale hotel.

330 Maple Road Site, Amherst, New York

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance for a small arms shooting range with hazardous lead and semi-volatile organic compounds (SVOCs) in soil. The RI involved collecting over 1,000 soil samples on 26-acre parcel slated for future mixed-use commercial and residential development. Bench-scale testing was completed to select a substrate to treat the characteristic hazardous soil to below toxicity characteristic leaching procedure (TCLP) thresholds. Remedial Action included:

- Physical removal of lead shot from the soil matrix;
- In-situ stabilization of characteristically hazardous lead-impacted soil; and
- Excavation and off-site disposal of lead and SVOC-impacted soil.

The site was remediated to allow for residential re-use.

275 Franklin Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site formerly used as drycleaner in western New York with significant soil and groundwater chlorinated VOC impacts. The investigation included a hydrogeologic assessment, including soil borings and overburden and bedrock monitoring well installation, development, and sampling. Soil was successfully remediated using a combination of soil vapor extraction and excavation and off-site disposal. Groundwater remediation involved in-situ treatment of impacted groundwater at the downgradient property boundary whereby groundwater migrated through a permeable reactive barrier. An active sub-slab depressurization system design and installation is planned in the new building during construction.

Niagara Street and Pennsylvania Avenue Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site formerly used as gasoline and service station in Buffalo, New York with significant petroleum impacts. The investigation included a hydrogeologic assessment, including soil borings and overburden monitoring well installation, development, and sampling. Remedial Action included:

- Demolition of the former service station building and product dispenser canopy and disposal of construction and demolition debris;
- Removal and recycling of approximately 80 tons of concrete at Iron City in Lackawanna, New York;
- Removal of five underground storage tanks, including all associated dispensing units and underground product piping;
- Excavation of petroleum-impacted soil/fill followed by off-site transportation and disposal a commercial landfill;
- Extraction and treatment of approximately 6,000-gallons of groundwater from the excavation during remediation activities using bag filtration and granular activated carbon and discharge to the municipal sewer; and
- Placement and compaction of approximately crusher run stone backfill to the approximate pre-existing grade.

1501 College Avenue Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former heavy industrial and manufacturing facility in Niagara Falls, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and overburden monitoring well installation, development, and sampling. Remedial Action included:

- Disposal of galbestos roofing and building materials;
- Collection and removal of seven (7) roll-off containers of abandoned drums and containers of off-spec former carbon electrode manufacturing materials;
- Waste petroleum oil was vacuumed out of two abandoned tanker trucks;
- Cleaning and collection of steel ASTs, empty drums and two (2) abandoned tanker trucks and transported off-site with other on-Site scrap metals (i.e., building demolition metals);
- Excavation and disposal of non-hazardous petroleum-impacted soil/fill;
- Excavation of PCB-impacted soil/fill;
- Extraction and storage of approximately 20,000 gallons of impacted water removed from the excavation for solidification and final disposal at a commercial landfill; and
- A soil cover system across the site.

500 South Union Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former dry cleaning facility in Spencerport, New York. The investigation included a hydrogeologic assessment, including exterior and interior soil borings, test pits and monitoring well installation, development and sampling, soil vapor testing and hydrogeologic assessment to design the in-situ groundwater treatment program. Remedial Action included:

- Installation of an active subslab depressurization system within the existing building to prevent migration of vapors into the building air;
- In-situ injection of treatment agent at 71 injection points located across the Site to enhance natural biodegradation of cVOCs in groundwater;
- Limited excavation and off-Site disposal of surface soil/fill exceeding commercial use soil cleanup objectives; and
- Construction and maintenance of a soil cover system consisting of the existing building, pavement (asphalt), sidewalks, and soil cover in all other areas at a minimum of one foot thick over the demarcation layer, to prevent human exposure to remaining contaminated soil/fill remaining at the Site;

The site is currently used as a multi-tenant commercial facility.

Scott Rotary Seals Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining facility in Olean, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling, as well as subslab vapor/indoor air testing. Remedial Action included:

- Limited excavation and off-Site disposal of shallow grossly contaminated soil to a depth of approximately 6-feet below final grade within the northwest area of the Site, including the building footprint and utility corridors;
- Installation of a soil vapor extraction system to treat grossly contaminated soil in the deeper vadose zone soil/fill from approximately 6-fbgs to the top of the groundwater surface;
- Construction and maintenance of a soil cover system consisting of buildings, pavement (asphalt and concrete), sidewalks, and soil cover in all other areas at a minimum of one foot thick over the demarcation layer, to prevent human exposure to remaining contaminated soil/fill remaining at the Site;
- Installation of an active sub-slab depressurization system within the newly constructed on-Site building to prevent migration of vapors into the buildings; and
- Installation of a LNAPL removal system within certain on-Site wells, utilizing absorbent socks.
- The site was redeveloped as a light industrial and commercial facility.

Olean Redevelopment Parcel 2 Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major storage facility in Olean, New York. The comprehensive investigation, which was completed over three separate sites (Olean Redevelopment Parcels 1,2 and 3) totaling approximate 60-acres, included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling.

As part of the investigation, bench-scale studies were completed to assess treatment of grossly contaminated petroleum soil (GCPS) impacted soil and lead-impacted soil. Soil/fill batches were treated by mixing to simulate landfarming; stabilized with lime, Portland cement, and fly ash (all amendments added at 2% and 5% by weight); and chemically oxidized with hydrogen peroxide (1% and 3% by weight).

Based on the results of the bench-scale treatability studies, four pilot-scale treatability studies were performed: in-situ SVE; ex-situ landfarming; force vented biopiles (FVBP); and solidification/stabilization. As part of these pilot-scale treatability studies, biofiltration was assessed as component of treatment of the extracted air from the in-situ SVE pilot study and for the FVBP pilot study.

Remedial Action included:

- Approximately 2,715-tons of arsenic contaminated soil/fill, 143-tons of mercury contaminated soil/fill and 638-tons of grossly contaminated petroleum soil (GCPS) was excavated, loaded, and transported off-Site to a commercial landfill;
- Approximately 34,313 linear feet of subsurface metallic product piping (steel, cast iron, lead and copper) was exposed, tapped, evacuated of contents, removed, cleaned and recycled or disposed. An additional 156 linear feet of wood pipe was also exposed, tapped, evacuated of contents, removed, cleaned and disposed off-site. Piping which extended beyond the property boundary was capped and/or grouted at the apparent property line. Approximately 240 cubic yards of GCPS was excavated during piping removal activities and treated on the on-site force-vented biopiles FVBPs and reused as backfill below the cover system;
- Approximately 24, 55-gallon drums were generated from the removal of the abandoned subsurface piping. The contents of the piping included LNAPL, residual pipe scale, and product sludge. The 24 drums (15 non-hazardous and 9 hazardous) were disposed at a commercial landfill. In addition to the drums, approximately 3.5 tons of tank contents that were placed into roll-off containers and solidified with Portland cement due to liquid content were disposed at a commercial landfill. Water extracted from excavations during piping removal was pumped into holding tanks, treated with bag filters and granular activated carbon (GAC) on-site, pumped into a secondary on-Site temporary holding tank, sampled, and discharged to the municipal sanitary sewer with approval under an Industrial Pretreatment Program permit. Approximately 4 drums of wash water generated during holding tank cleaning were disposed at a commercial landfill;
- Design, installation, and operation of a SVE system to address GCPS in the deeper soil/fill from approximately 2 to 15 fbgs. The SVE system included the installation of 13 SVE wells, associated conveyance piping, and placement of three trailer-mounted SVE blowers. Emissions from the SVE system were controlled using biofilters, which allowed the naturally

occurring microbes to bioremediate the air stream and control the nuisance odors from the SVE systems.

- Light non-aqueous phase liquid (LNAPL) recovery was completed utilizing hydrocarbon absorbent socks at one well and a product pump at one well. LNAPL thicknesses at these locations have been measured to vary from 0 to 6.5 ft. Recovered product was transferred to properly labeled and sealed 55-gallon drums at the Site for future off-Site disposal.
- A site cover system was constructed to allow for commercial use of the Site. The cover system consists of a minimum of one foot of soil. A portion of the Site is covered with an asphalt road that serves as part of the cover system. The soil cover was placed over a demarcation layer, consisting of orange plastic mesh, and was hydroseeded and fertilized. On-Site drainage ditches were lined with rip-rap.

Olean Redevelopment Parcel 3 Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major storage facility in Olean, New York. The comprehensive investigation, which was completed over three separate sites (Olean Redevelopment Parcels 1,2 and 3) totaling approximate 60-acres, included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling.

As part of the investigation, bench-scale studies were completed to assess treatment of grossly contaminated petroleum soil (GCPS) impacted soil and lead-impacted soil. Soil/fill batches were treated by mixing to simulate landfarming; stabilized with lime, Portland cement, and fly ash (all amendments added at 2% and 5% by weight); and chemically oxidized with hydrogen peroxide (1% and 3% by weight).

Based on the results of the bench-scale treatability studies, four pilot-scale treatability studies were performed: in-situ SVE; ex-situ landfarming; force vented biopiles (FVBP); and solidification/stabilization. As part of these pilot-scale treatability studies, biofiltration was assessed as component of treatment of the extracted air from the in-situ SVE pilot study and for the FVBP pilot study.

Remedial Action included:

- Approximately 425-tons of arsenic contaminated soil/fill, 235-tons of GCPS was excavated, loaded, and transported off-Site to a commercial landfill;
- Approximately 7,592-tons of lead contaminated soil/fill was stabilized in-place utilizing Portland cement to treat the soil and render it non-hazardous;
- Approximately 50,667 linear feet of subsurface metallic product piping (steel, cast iron, lead and copper) was exposed, tapped, evacuated of contents, removed, cleaned, and recycled or disposed. An additional 232 linear feet of wood pipe was also exposed, tapped, evacuated of contents, removed, cleaned, and disposed off-site. Piping which extended beyond the

property boundary was capped and/or grouted at the apparent property line. Approximately 2,552 cubic yards of GCPS was excavated during piping removal activities and treated on the on-site FVBPs and reused as backfill below the cover system;

- Approximately 33, 55-gallon drums were generated from the removal of the abandoned subsurface piping. The contents of the piping included LNAPL, residual pipe scale, and product sludge. The 33 drums (21 non-hazardous and 12 hazardous) were disposed at a commercial landfill. In addition to the drums, approximately 4.9 tons of tank contents that were placed into roll-off containers and solidified with Portland cement due to liquid content were disposed at a commercial landfill. Water extracted from excavations during piping removal was pumped into holding tanks, treated with bag filters and granular activated carbon (GAC) on-site, pumped into a secondary on-Site temporary holding tank, sampled, and discharged to the municipal sanitary sewer with approval under an Industrial Pretreatment Program permit. Approximately 6 drums of wash water generated during holding tank cleaning were disposed at a commercial landfill;
- Installation and operation of a SVE system to address GCPS in the deeper soil/fill from approximately 2 to 15 fbs. The SVE system included the installation of 58 SVE wells, associated conveyance piping, and placement of three trailer-mounted SVE blowers. Emissions from the SVE system were controlled using biofilters, which allowed the naturally occurring microbes to bioremediate the air stream and control the nuisance odors from the SVE systems.
- LNAPL recovery was completed utilizing hydrocarbon absorbent socks;
- A site cover system was constructed to allow for commercial use of the Site. The soil cover was placed over a demarcation layer, consisting of orange plastic mesh, and was hydroseeded and fertilized. On-Site drainage ditches were lined with rip-rap.

The site was redeveloped as a commercial solar power generating facility.

Olean Redevelopment Parcel 1 Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major storage facility in Olean, New York. The comprehensive investigation, which was completed over three separate sites (Olean Redevelopment Parcels 1,2 and 3) totaling approximate 60-acres, included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling.

As part of the investigation, bench-scale studies were completed to assess treatment of grossly contaminated petroleum soil (GCPS) impacted soil and lead-impacted soil. Soil/fill batches were treated by mixing to simulate landfarming; stabilized with lime, Portland cement,

and fly ash (all amendments added at 2% and 5% by weight); and chemically oxidized with hydrogen peroxide (1% and 3% by weight).

Based on the results of the bench-scale treatability studies, four pilot-scale treatability studies were performed: in-situ SVE; ex-situ landfarming; force vented biopiles (FVBP); and solidification/stabilization. As part of these pilot-scale treatability studies, biofiltration was assessed as component of treatment of the extracted air from the in-situ SVE pilot study and for the FVBP pilot study.

- Approximately 1,652 tons of arsenic contaminated soil/fill, 110 tons of mercury contaminated soil/fill, approximately 357 tons of PCB contaminated soil/fill, and approximately 5,722 tons of PAH (SVOC)-contaminated was excavated, loaded, and transported off-site to a commercial landfill;
- Removal of an ammonia tank, approximately 500-gallon stainless steel vertical UST with no piping, and associated PCB- and ammonia-impacted soil;
- Approximately 49,976 linear feet of subsurface metallic product piping was exposed, tapped, evacuated of contents, removed, cleaned, and recycled. An additional approximate 578 tons of GCPS contaminated soil/fill was excavated, loaded, and transported off-site to a commercial landfill;
- Approximately 48, 55-gallon drums were generated during the remedial work, 42 of which were generated from the removal of the abandoned subsurface piping. The contents of the piping included LNAPL, residual pipe scale, and product sludge. Water extracted from excavations during piping removal was pumped into holding tanks, treated with bag filters and granular activated carbon (GAC) on-site, pumped into a secondary on-site temporary holding tank, sampled, and discharged to the municipal sanitary sewer;
- Installation and operation of a SVE system to address GCPS in the soil/fill from approximately 2 to 15 fbs. The SVE system included the installation of seven SVE wells, associated conveyance piping, and placement of an SVE blower. Emissions from the SVE system were controlled using a biofilter to bioremediate the air stream and control the nuisance odors from the SVE system;
- LNAPL recovery was completed using hydrocarbon absorbent socks and/or manual bailing at six wells and a product skimmer at one well. LNAPL thicknesses at these locations has been measured to vary from 0.3 to 5.05 ft. Recovered product was transferred to properly labeled and sealed 55-gallon drums at the Site for off-site disposal; and
- Construction and maintenance of a site cover system.

A portion of the site was redeveloped as a hotel.

251 Homer Street Redevelopment Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a

former petroleum refining and major petroleum storage facility in Olean, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling. Remedial Action included:

- Removal and recycling of approximately 10,644 linear feet of piping (approx. 97 tons) ranging in diameter from 2-inch to 12-inch. Removal and disposal of 51, 55-gallon drums containing oil, sludge, and scale from within the piping. Extraction, treatment, and discharge of approximately 21,000 gallons of water from within the pipes and perched water encountered during trench excavation under a temporary discharge permit issued by the municipal Wastewater Treatment Plant (WWTP);
- Excavation and off-site disposal of 49,670 tons of grossly contaminated soil (GCS) followed by backfill with clean imported soil. The on-site drainage ditch was converted to a closed 30-inch subsurface drainage pipe as discussed with NYSDEC;
- Excavation and off-site disposal of approximately 2,106 tons of arsenic-impacted soil/fill followed by backfill with clean imported soil;
- Extraction, treatment using granular activated carbon (GAC), and discharge of approximately 250,000 gallons of water encountered during excavation activities under a temporary discharge permit issued by the municipal WWTP;
- Temporary re-routing of Two Mile Creek, followed by excavation of approximately 4,000 tons on-site and 973 tons off-site of Two Mile Creek bed and bank material followed by off-site disposal, and backfilling. The creek bed and banks were restored with stone (creek bottom), and clay and clean soil (creek banks), including biodegradable erosion control blanket, riparian shrubs and hydro-seeding of creek banks;
- Construction and maintenance of a cover system consisting of a minimum 12 inches of clean soil or gravel to prevent human exposure to remaining contaminated soil/fill remaining at the site.

The site was redeveloped as a commercial solar power generating facility.

300 Ohio Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum storage and sales facility in Buffalo, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling, as well as sub-slab vapor/indoor air testing. Remedial Action included:

- Excavation and off-site disposal of the underground storage tank (UST) system. A total of sixteen (16) USTs and related piping and appurtenances were uncovered and removed, cleaned of residual contents and transported off-site for recycling as scrap;

- Excavation and off-site disposal of approximately 18,650 tons of grossly contaminated petroleum soil, approximately 220 tons of soil/fill exceeding 500 ppm total PAHs, and approximately 425 tons of soil/fill exceeding Commercial Use SCOs for arsenic and lead;
- Approximately 500 cubic yards (cy) of recyclable concrete and stone generated from the removal of buildings and sign footers/foundations, was crushed on-Site and used for backfill and subsurface grading beneath the cover system; and
- Construction and maintenance of a cover system consisting a minimum of 12 inches of approved soil/stone material above a demarcation fabric to prevent human exposure to contaminated soil/fill remaining at the site.

A portion of the site was redeveloped as a brewery and restaurant.

229 Homer Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major petroleum storage facility in Olean, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling, as well as a soil vapor intrusion assessment. Remedial Action included:

- Approximately 5,815 tons of grossly contaminated soil GCS-impacted soil/fill was excavated and transported off-site for disposal at a commercial landfill;
- Approximately 1,946 linear feet of subsurface metallic product piping was exposed, tapped, evacuated of contents, removed, cleaned and recycled. Piping which extended beyond the property boundary was capped and/or grouted at the property line.
- Approximately 19 tons of piping was recycled as scrap metal. Cleaning of the pipes generated 4 drums of pipe scale, oil, and water, which was transported off-site for incineration.
- Design, installation, and operation of an air sparge/soil vapor extraction (AS/SVE) system to address GCS in the deeper soil/fill from approximately 5 to 15 fbg and in the upper 5 ft of the water table (i.e., smear zone). The air sparge portion of the system includes 53 injection wells connected to an air compressor in a climate-controlled trailer via individual 1" polyethylene lines. The SVE system includes 14 extraction wells connected by 2" polyethylene lines to one of two blowers in a separate climate-controlled trailer. Emissions from the SVE system are controlled using a biofilter, which allows naturally occurring microbes to bioremediate the air stream and control the nuisance odors from the AS/SVE system;
- Construction and maintenance of a site cover system.

Former Trico Plant Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a

former manufacturing facility in Buffalo, New York. The investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling, as well as subsurface vapor/indoor air testing. Remedial Action included:

- Construction and maintenance of a site cover system.
- In-situ on-site treatment of groundwater contaminated with chlorinated volatile organic compounds (cVOCs);
- Removal of six (6) hydraulic lifts and associated infrastructure and impacted soil/fill;
- Pumping and on-site treatment of water present in the building sub-basement prior to sanitary sewer discharge under a temporary discharge permit;
- Cleaning accessible sump and sewer structures with evidence of potential impacts;
- Removing and properly disposing off-site miscellaneous abandoned regulated waste materials; and abating building components for lead, asbestos, oil staining, PCBs, etc. as required during redevelopment. Building surfaces and features planned to remain with evidence of impacts from historic operations will be encapsulated or sealed;
- Installing an active sub-slab depressurization (ASD) system within the existing buildings; and
- Maintaining existing cover system in accordance with 6NYCRR Part 375 and NYSDEC DER-10 guidelines. The cover system includes building foundations and asphalt on former Burton Street.

The site is being redeveloped as a mixed-use commercial and residential complex.

Jamison Road Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at an active industrial facility in Elma, New York. The Remedial Investigation was completed across the BCP Site and off-site on adjacent parcels to supplement previous environmental data and delineate or identify areas requiring remediation. Field activities included soil boring advancement; test pit excavations; surface and near-surface soil/fill sampling; overburden and bedrock monitoring well installation; groundwater and storm water quality sample collection; soil vapor sample collection; and sub-slab vapor, indoor air, and outdoor air sample collection in six on-site buildings and one off-site building. Hydraulic conductivity testing was also completed in the overburden groundwater zone as well as the bedrock groundwater to assess groundwater transmissivity. Remedial Action included:

- Excavation of 2,430 tons of contaminated soil/fill, which was disposed off-site at a commercial landfill;
- 314 tons of flowable fill proximate to a sewer line was excavated as it was deemed unsuitable due to structural considerations, which was also disposed off-site at commercial landfill;
- Two steel former pipes that ran along the eastern boundary of an on-site building were removed and disposed at a

commercial landfill. Approximately 10-gallons of residual hydraulic oil removed from the pipes was transported and recycled off-site;

- Approximately 13,415 cubic yards (CY) of non-impacted soil was excavated for the construction of new buildings. With NYSDEC approval, 12,250 CY of soil was exported for reuse at another site and the remaining soil was reused on-site;
- During overburden soil removal, approximately 1,100,000 gallons of Chlorinated VOC-impacted groundwater was extracted, treated using granular activated carbon, tested, and discharged;
- A former 15" concrete storm sewer was encountered during foundation excavation for new buildings. Approximately 150 gallons of emulsified oil and water were removed using a vacuum truck, transported to an on-site frac tank and later disposed. A portion of the former sewer was removed, and the remaining portion of the sewer was filled in with concrete;
- Installing an active sub-slab depressurization (ASD) system within two new building and two existing buildings;
- As part of the remedial design, a bench-scale treatability study evaluation of media was conducted. The study included four column reactors filled with four different material combinations to determine which most effectively removed CVOCs from the Site groundwater. A proprietary product comprised of granular carbon and zero-valent iron was selected as the treatment medium;
- Implementation of in-Situ Chemical Reduction (ISCR) in the form of a permeable reactive barrier (PRB) with two approximate 250-foot long slurry wall legs to direct the groundwater toward the PRB. The slurry walls consist of a homogeneous mixture of soil, bentonite, and water, with a maximum hydraulic conductivity of 1×10^{-6} cm/s. The PRB and slurry wall legs were installed in the northwestern corner of the site to treat groundwater impacted by chlorinated volatile organic compounds;
- Implementation of in-situ phytoremediation using hybrid poplar trees to treat groundwater impacted by 1,4-dioxane. The hybrid poplar trees were planted in two rows in the northwestern corner of the site, upgradient of the PRB; and
- Installation of an in-line air stripper to remove CVOCs from storm water prior to discharge.

The site has been redeveloped with a mixed-use industrial manufacturing facility and related research and development offices.

1827 Fillmore Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former gravel pit filled in with miscellaneous soil/fill and construction and demolition debris in Buffalo, New York located adjacent to two public schools. The Remedial Investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well

installation, development, and sampling. As part of the Remedial Investigation, bench-scale studies were completed to assess treatment characteristically hazardous lead-impacted soil. Soil/fill batches were treated by mixing different amendments, including Portland cement and phosphoric acid, at varying percentages by weight. 5% Portland cement was selected as the soil amendment.

Remedial action included:

- In-situ stabilization of approximately 3,091 cubic yards of characteristic hazardous lead soil/fill using Portland cement in two remedial areas of concern;
- Excavation and off-site disposal of contaminant source areas, including soil exceeding the site-specific action levels (SSALs) of 3,900 ppm of lead and soil containing total semi-volatile organic compounds (SVOCs) exceeding 500 ppm. Approximately 2,200 tons of soil was removed and disposed off-Site, including 160 tons of soil exceeding the hazardous criteria for lead, which was treated in-situ and rendered non-hazardous prior to disposal; and
- Construction and maintenance of a soil cover system consisting of a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer to prevent human exposure to remaining contaminated soil/fill.

The site is planned to be redeveloped with mixed-use commercial and residential buildings.

3100 Clinton Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former railyard filled in with miscellaneous soil/fill in West Seneca, New York and located adjacent to a regulated wetland. The Remedial Investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling. Remedial Action included:

- Clearing and grubbing of vegetation, shrubs, and trees to allow remedial excavation activities. Approval to complete work activities within designated wetland areas was received from the United States Army Corps of Engineers and NYSDEC prior to starting work in those areas;
- Excavation and off-site disposal of approximately 45,850 tons (approximately 30,600 cubic yards) of PAH- and metals-impacted soil/fill;
- Excavation and off-site transport to an approved location of a total of 761 loads of surplus native soils which were determined to be structurally unsuitable for redevelopment purposes;
- Excavation and off-site disposal of 5.9 tons of treated/weathered wood (former railroad ties);
- Collection, storage, volume measurement, and discharge of 1,005,000 gallons of groundwater and/or rainwater encountered during remedial activities;

- Backfilling of the excavation area with approximately 172,724 tons of backfill including screened backfill and surge stone. Surge stone was required in areas of the site where natural soils were not suitable for geotechnical requirements of the planned building. In those areas, certain native soils were removed and/or bridged with filter fabric and surge stone was installed beneath compacted gravel.

The site was redeveloped with state-of-the-art food processing protein plant.

351 Franklin Street Site

Manager and Principal Investigator/Remediator for a Remedial Investigation/Alternatives Analysis and Remedial Action under NYSDEC guidance at a NYSDEC Brownfield Cleanup Program site at a former petroleum refining and major storage facility in Olean, New York. The Remedial Investigation included a hydrogeologic assessment, including soil borings, test pits and monitoring well installation, development, and sampling. Exterior soil vapor sampling and an interior soil vapor intrusion (SVI) assessment was completed within one on-site building. A pre-design investigation included additional groundwater monitoring wells and gauging/monitoring levels of light non-aqueous phase liquid (LNAPL). As part of the remedial design, bench-scale studies will be completed to assess potential treatment options for grossly contaminated material (GCM), including assessment of Portland cement and other potential amendments (e.g., lime-kiln dust), at varying percentages by weight.

Remedial actions to be completed include:

- Excavation and reuse of the top one foot of SVOC- and arsenic-impacted soil under the cover system, and disposal of excess material;

- Excavation of non-GCM-impacted soil/fill that resides over the GCM and staging of the material on-site for reuse as backfill under the cover system;
- Excavation and disposal of approximately 16,000 tons of GCM-impacted soil/fill and completion of in-situ solidification (ISS) as needed to address GCM-impacted soil/fill at the water table, followed by backfill and site grading. After the completion of ISS mixing activities, the solidified soil will be allowed to cure for 28 days. After the mixture has cured, core samples will be collected from the solidified soil and post-treatment tests, including unconfined compressive strength (UCS), permeability testing and free liquid testing, will be completed to ensure that the solidified soil meets ISS performance requirements;
- Solidification of excavated soil, as needed, prior to disposal, based on landfill requirements;
- Removal and transfer of abandoned petroleum piping encountered during GCM excavation activities to a recycling facility and extraction and disposal of piping contents;
- Management of impacted groundwater and stormwater during remedial activities;
- Placement of a cover system across the entire Site;
- Installation of an active sub-slab depressurization (ASD) system in the newly constructed building during construction and completion of SVI sampling;
- Monitoring of groundwater level and LNAPL; and
- Removal of LNAPL via bailing or in-well pumps as needed from monitoring wells over time.

The site is planned for a redevelopment as a mixed use commercial and light industrial building.