

TECHNICAL SPECIALTIES

Implementation of soil and ground-water investigation and remediation at industrial and hazardous waste sites. Management of multiple site acquisition/divestiture programs including cost analysis and risk assessments of future liabilities. Managed site industrial property decontamination/demolition. Conducted Regulatory compliance audits, permitting and contingency planning.

EXPERIENCE SUMMARY

37 years of experience: COO, Principal Scientist and Vice President and Office Manager at Roux Associates, Field Operations Manager for IT Corporation, Haz-Mat Operations Supervisor and Project Manager at NEPCCO, Project Team Leader for ground water investigations conducted by the Stockton State College Environmental Research Center

Managed and participated in remedial activities under USEPA and state jurisdiction including NJ, NY, PA, CT, DE, MD, SC and NC

CREDENTIALS

B.S. Marine Science, Stockton State College, Pomona, New Jersey, 1978

University of Texas A&M, Hazardous Material Control Course

Certified Hazardous Materials Manager Master's Level (#6280)

NJDEP UST Certification #0011328 (Surface Evaluation/Closure)

OSHA 40-Hour Health and Safety Training

OSHA 8-Hour Supervisor Training

KEY PROJECTS

- Principal-in-Charge during decontamination and demolition of a 10 Arce Sulfuric Acid plant located in Virginia. Scope of Work included asbestos abatement, decon and demolition of multiple process buildings, dozens of AST's and process vessels. The 2.5 million dollar project was completed safely over a 6 month period.
- Principal-in-Charge for the assessment and sampling of all process lines, pipes, vessels and tanks for a chemical manifesting and bottling facility. Decon/demolition bid specifications were developed based on assessment estimates and take-offs from site inspection/sampling activities. The scope of work also included part time construction management for the facility decontamination and demolition. The project took 10 months to complete and was done safely, on schedule and within budget.
- Principal-in-Charge for the assessment of various hazardous substances associated with a 100-year old power generation facility. The assessment data was used to establish a decon and demolition plan, schedule and budget. The project is schedule to be

completed in 2016 which will include: decon and demolition of the power plant, and smoke stack.

- Principal-in-Charge during decontamination and demolition of former fiberglass manufacturing facility. Scope of work included surgical demolition of furnaces to remove chrome-based refractory brick (RCRA hazardous waste), a building implosion of a 140-foot tower, decontamination of the former manufacturing process equipment contaminated with phenol, formaldehyde and mercury, asbestos abatement, lead paint abatement, general demolition and waste disposal activities.
- Principal in Charge during planning, specifying and solicitation of bids for the second phase of a high profile mercury decontamination project for an active mercury processor. Effort includes the decontamination of approximately 25 tanks, some containing Phenylmercuric Acetate, a highly aggressive mercury compound requiring Level A PPE.
- Coordinated, supervised, and managed emergency response operations at more than 100 spill sites and participated in more than 400 emergency response incidents. Participated at 3 train derailments during the emergency response, investigative, and remediation phases.
- Assistant Manager, in cooperation with the USCG, at two major oil spills (in excess of 500,000 gallons) occurring on navigable waterways. Activities conducted included the management of a work force of over 200 individuals and 15 vessels and petroleum recovery ships.
- Principal-in-Charge for spill response, investigation, remediation and upgrade of fuel system for a training facility in MD. Project included successful investigation and removal of 20,000 gallon UST, associated piping and impacted soils. Evaluation of fuel usage led to a design of a dual replacement system, using a much smaller manifolded dual AST system. Implementation included preparation of SPCC plan and assistance in training on-site personnel.
- Project Coordinator of multi-year environmental consulting contract with New Jersey Transit and Office Coordinator for Amtrak. Responsibilities include contract negotiations, workload/resource distribution, compliance with contract requirements including utilization of M/WBE contractors, client-staff liaison, adherence to budgets and schedules, and overall quality assurance.
- Principal-in-Charge of investigation, remediation and closure activities at dozens of railroad and transit sites in the northeast. Sites include PCB-containing

transformer substations, regional bases, passenger stations, maintenance and layover yards, mainline tracks and bus maintenance facilities. Activities included soil, groundwater and free product sampling, report preparation, negotiation with regulators for no further action based on natural attenuation of groundwater, free product removals, negotiation of site-specific soil cleanup levels, UST removals/abandonments, soil remediation, preconstruction sampling and waste disposal.

- Principal in charge for the Maywood Chemical Superfund Site in Maywood, New Jersey. Mr. Penders managed the preparation of the groundwater feasibility study, specifically identifying and developing the technical justification for monitored natural and enhanced natural attenuation of chlorinated compounds in bedrock groundwater.
- Principal/Director on a due diligence project for a Fortune 100 petroleum company for the divestiture of retail service stations throughout the Mid-Atlantic and New England regions of the United States. The purpose of the project was to complete an assessment of over 1,000 retail service stations with the intention of divesting of both the property and the liability. Roux Associates provided the client with strategic insights for developing and managing the overall project. In addition, Roux Associates performed over 180 Phase I ESAs in accordance with ASTM E1527-05, developed the scope of work for the Phase II site characterizations within a four-month period; finishing ahead of schedule and on budget.
- Following the Phase I ESAs, Roux Associates was retained to perform the Phase II site characterizations at 60 of the retail service station sites. The scope of work for each site in general included a geophysical survey, soil borings and soil samples, and installing monitoring wells and sampling groundwater. The Phase II investigations generated a substantial volume of data including laboratory results, well location survey data, groundwater elevation measurements and boring logs; all of which was presented in a summary report of each site. Roux Associates coordinated closely with the subcontractors to ensure the data was received in a format consistent with Roux Associates GIS system.
- Project Principal for an active bus storage and maintenance garage where an investigation and remediation is being performed under the oversight of the NJDEP Bureau of Responsible Party Remediation. The investigation included soil and groundwater sampling associated with a benzene, toluene, ethylbenzene, and xylene (BTEX) release from several previously removed USTs. In addition, chlorinated solvents, specifically trichloroethene

(TCE), were also delineated in soil and groundwater that were associated with a historical surface release. Roux Associates, Inc. designed, constructed and operated a soil vapor extraction (SVE) that successfully remediated TCE concentrations in the unsaturated soil of the test area to below the NJDEP soil cleanup criteria (SCC). Monitored natural attenuation (MNA) was approved for the VOCs detected in groundwater. A Classification Exception Area (CEA) has been submitted for the Site and NJDEP approval is anticipated soon.

- Project Principal for a Phase 1 and 2 ESA at the former bus garage in Trenton, NJ that dated back to the 1920s and operated as a bus fueling, maintenance and storage facility. Numerous USTs were identified or were suspected to have been present at the facility. Geophysical techniques, including ground penetrating radar (GPR), were used to evaluate for the presence of the USTs. Three USTs were found and removed. Petroleum impacted soils were excavated and disposed. Six hydraulic bus lifts were also removed. Soil borings were completed around the USTs and at other potential areas of concern (AOCs) including an extensive floor drain system, numerous bus lifts, historical coal bins, and pole-mounted transformers.
- Project Principal for a soil investigation at an active rail yard in New Jersey. Roux Associates, Inc. performed soil sampling to confirm the presence of polychlorinated biphenyls (PCBs) in soil at the Site. In addition, soil samples were also analyzed for other parameters to evaluate for the presence of other constituents that may require delineation and/or remediation. Upon completion of the initial soil sampling activities, Roux Associates, Inc. prepared a Remedial Investigation Work Plan (RIWP) for delineation of the constituents identified at the Site and a sampling strategy to minimize the volume of soil disposed as a Toxic Substance Control Act (TSCA) waste. Implementation of the RIWP confirmed that elevated concentrations of PCBs are present to a depth of approximately two feet below ground surface, which will be excavated as part of a forthcoming Remedial Action Work Plan (RAWP).
- Project Principal for an ISRA filing for a chemical manufacturing facility in Rahway, New Jersey. The ISRA related activities included the completion of a General Information Notice, a Preliminary Assessment Report, and Site Investigation Report. The Site Investigation included the soils investigation at 14 areas of concern and a groundwater investigation. A baseline ecological evaluation and well search were completed for the site.
- Principal on a design of green soil profiles and Constructed Treatment Wetland system for

management of industrial stormwater as part of a new aluminum smelter development in Iceland. Part of an international team of professionals applying state-of-the-art water management technologies throughout the facility in support of the client's zero discharge corporate goal.

- Principal in charge of a free product recovery pilot tests at a northern New Jersey railyard in order to establish design parameters for the remediation of three distinct hydrocarbon plumes. Tests included total fluids and hi-vac recovery methods based on varying product and site characteristics. Designed product skimming and total fluids remediation systems to be installed in conjunction with a major facility upgrade.
- Principal in charge of implementation of an enhanced bioremediation and phytoremediation pilot study program for a chemical manufacturer in Maywood, New Jersey. Tasks included calculation of contaminant mass in ground water and soil, calculation of Oxygen Release Compound (ORC) mass required for effective ground-water bioremediation, design of optimum ORC slurry boring locations and injection depths, preparation of a site specific health and safety plan as well as a monitoring protocol involving volatile organics, metals, pyrophoric waste, and radioactive wastes, and project management support for the application of biomass and nutrients to contaminated soil. Tasks also included project management support with respect to the installation of trees and nutrients required as part of the phytoremediation pilot study.
- Preparation of a Remedial Action Selection Report (RASR)/Remedial Action Work Plan (RAWP) Addendum and soil vapor extraction (SVE) system design for a public transportation garage facility in Camden, New Jersey. Contamination at the site includes VOCs (namely BTEX) in ground water and chlorinated VOCs (mainly TCE) in both soil and ground water. The RASR/RAWP Addendum proposed SVE for TCE-contaminated soil and monitored natural attenuation for all ground-water contamination based on pilot study work that was completed by Roux Associates, Inc. The NJDEP approved the RASR/RAWP Addendum in its entirety and the SVE system is currently under construction.
- Principal in charge for the remedial evaluation and design of a High Vacuum Dual Phase Extraction (HVDPE) system for a specialty paint manufacturing facility in Jersey City, NJ. The remedial design was completed to address ethylbenzene, toluene and xylene (ETX) contamination in soil, ground water and separate-phase product. The HVDPE system consists of a series of extraction wells, interconnecting

pipings through existing subsurface conduits, a liquid ring pump, a moisture separator, miscellaneous liquid transfer pumps, an oil/water separator, iron filtration, liquid-phase carbon filters, a catalytic oxidizer for vapor-phase treatment and associated electrical, plumbing and control systems (including telemetry). Due to plant operations and the need to install the HVDPE equipment inside of a plant building, all HVDPE equipment, electrical and controls were rated for a Class 1, Division 1 location (explosion-proof and/or intrinsically safe). The HVDPE system is currently managed, operated and maintained under Mr. Patterson's supervision by Roux Associates, Inc. During HVDPE system operation, total xylenes concentrations in ground water have been reduced from as high as 68,000 parts per billion (ppb) to non-detect in the extraction well area.

- Principal in charge for the construction of a new ground-water remediation system (GWRS) at a pharmaceutical manufacturing facility in Piscataway, New Jersey to replace an antiquated GWRS for the remediation of ground-water impacted with acetone, methyl iso-butyl ketone and di-isopropyl ether in excess of the NJ GWQC. The GWRS design included the use of a patented heated air stripping technology paired with iron pretreatment and catalytic oxidation off-gas treatment to treat the extracted ground-water for discharge to the Middlesex County Utilities Authority (MCUA) sanitary sewer. The project also included the design and implementation of two new bedrock ground-water extraction wells and the management of redevelopment activities for thirteen existing ground-water extraction wells. Roux Associates' scope of work included preparing an options analysis, Basis of Design (BOD) and full contract design drawings and contract specifications for the construction of the new GWRS. Roux Associates also managed and evaluated contractor bids, provided construction management and oversight services, coordinated state and local treatment works permitting, negotiated the elimination of a Township of Piscataway sewer connection fee and prepared GWRS startup procedures. The GWRS is currently under construction and Roux Associates will provide GWRS startup assistance and O&M management for the client.
- Provided UST management and implemented site assessment, investigation and remediation programs at over 100 facilities located in NJ, NY, PA, and DE.
- Principal in Charge of multi-disciplinary remediation of bulk oil storage terminals located in New Jersey under the NJ-ECRA program. The projects involved low temperature thermal desorption and bio-

remediation of petroleum contaminated soils, and the recovery and treatment of ground water.

- Principal in Charge for environmental services at over 30 facilities for a major water supply company. Services provided included tank decommissioning, soil and ground-water investigations and implementation of remediation programs
- Principal in Charge and coordinated design requirements for numerous soil venting programs to remediate gasoline-contaminated soils in several states. Programs included soil-gas surveys and pilot venting programs, and installation of a full-scale soil venting systems.
- Principal in Charge and coordinated design requirements for ground-water pump and treat systems for separate-phase petroleum products and dissolved-phase constituents recovery and treatment.
- Project Manager responsible for a \$2 Million remedial investigation, remedial design and remedial action at a petroleum distribution terminal in central New Jersey. Ground water was impacted by dissolved and separate-phase petroleum compounds. The remedial program included the treatment of 15,000 cubic yards of impacted soils by bioremediation, ground-water recovery and remediation and separate-phase product removal.
- Principal-in-Charge responsible for a \$1 million remedial action at a petroleum distribution terminal in southern New Jersey. Ground water was impacted by dissolved-phase petroleum compounds. The remedial program included soil remediation through low temperature thermal desorption and design of a ground-water remediation recovery and treatment system.
- Principal-in-Charge for a \$200,000 Remedial Investigation at a petroleum distribution terminal located in Southern New Jersey. Investigation activities resulted in no further actions required at the site under existing ECRA provisions.
- Principal-in-Charge of an ISRA remedial investigation for a landfill site in New Jersey. A disposal area, located adjacent to wetlands, contains heavy metal compounds and sludges. Project activities have included landfill delineation and characterization, evaluation of ground-water quality, assessment of local and regional geology/hydrogeology and preliminary screening of remedial options.
- Principal-in-Charge for the design of a ground-water pump and treat system for #6 fuel oil, gasoline and sulfuric acid including a multiple extraction well array, conveyance piping, treatment plant and components, and distribution piping to a secondary on-site

treatment system for a major pigments manufacturer located in Pennsylvania.

- Principal in Charge during oversight services for decontamination and demolition of mercury contaminated process equipment at an active chemical manufacturing facility in northern New Jersey. Remedial activities included the decontamination of process tanks and piping using high pressure water rinsing methods, select demolition of process equipment and piping while maintaining daily plant activities.
- Principal in Charge of ECRA/ISRA approved property transfer of metal fasteners manufacturing facility. Regulatory approved closure was achieved within 12 months of the triggering event. Project challenges included developing strategic plans consistent with ECRA, but also in compliance with the proposed ISRA requirements; effective management of both the plant and corporate interests; and oversight and guidance for the due diligence work being conducted by the buyer's consultant. None of the original investigative work had to be redone due to effective anticipation of changing regulatory requirements.
- Principal in Charge of ACO/ISRA Remedial Investigation (RI) and Remedial Action Plan (RAP) under N.J.A.C. 7:26E procedures. The \$5MM remedy includes one of the first NJDEP-approved site-specific soil cleanup standards. The previous remediation cost estimate was \$60MM and the former industrial property was expected to remain unusable. The site has recently been sold following the completion of remedial actions.
- Provided senior and principal participation during feasibility studies pertaining to the removal and treatment of chlorinated compounds, petroleum hydrocarbons, PCBs and heavy metals.
- Provided Principal-level review and alternative remedy comparison of treatment alternatives, and cost projections under CERCLA, RCRA and state cleanup programs.
- Project Manager for remedial investigation programs in New Jersey and Pennsylvania for PCBs, petroleum hydrocarbons, metals and solvents.
- Principal in Charge and negotiated numerous NJ-ECRA investigations including submission and execution of cleanup plans under NJDEP oversight.
- Supervised field and final design of numerous vapor abatement projects for residential and commercial structures.

- Managed and supervised a dioxin sampling project at a major industrial site in New Jersey. Project activities included regulatory agency negotiations, development of field decontamination protocols and data evaluation and submission.
- Provided Principal-level support for determination and evaluation of remedial alternatives with respect to costing and engineering assumptions and alternatives.
- Principal-in-Charge for remedial investigation for a landfill site in New Jersey. Disposal area contained sludges and heavy metal compounds. Project activities included landfill delineation and characterization, evaluation of ground-water quality and preliminary screening of remedial options.
- Principal-in-Charge responsible for the ISRA RI at an aerospace equipment manufacturing facility in central New Jersey. Volatile organic compounds and heavy metals have been detected in two water-bearing zones underlying the site. In addition, the site is located adjacent to an extensive wetland system designated by NJDEP as a Natural Area requiring special protection. Remedial measures include soil excavation and capping, ground-water extraction and sediment removal. Through the use of ecological risk assessment methods, natural remediation was approved for most of the wetlands areas.
- Project Manager supporting a major freight distribution company with the evaluation of stormwater permitting requirements for 21 terminals in eight states. Roux Associates, Inc. evaluated permitting responsibilities and likely stormwater management practices relative to owned versus leased facilities and whether facility operations included vehicle maintenance in addition to freight distribution. For each state program and facility type, Roux Associates, Inc. evaluated whether the client should file site-specific permits or employ the general permit being developed in conjunction with an industry trade association.
- Principal-in-Charge of an evaluation of a specialty chemical manufacturing facility relative to storm-water regulatory issues. The evaluation included assessing the facility's materials receiving and storage, manufacturing, and waste handling practices and procedures related to current and proposed storm-water regulations and permitting requirements. The evaluation was an integral part of Best Management Practices (BMPs) which was included as an integrated component of the Stormwater Pollution Prevention Plan (SWP3).
- Principal-in-Charge for an ISRA remedial investigation and compliance program for a 1,200 acre explosives manufacturing plant in New Jersey. Site activities have included identification, evaluation and prioritization of potential Areas of Concern, development of a facility-wide Discharge Prevention, Containment and Countermeasure Plan, and preparation of a Landfill Closure Plan.
- Principal-in-Charge of RCRA Corrective Action project at an 11 acre metals finishing facility in Florence, South Carolina. Soils, ground water, surface water and sediments are impacted by chlorinated VOCs and metals. The RCRA Facility Investigation has identified ground-water contamination in two aquifers. Interim Corrective Measures have been implemented and include landfill closure, lagoon closure and ground-water extraction. Project activities include strategic planning and management, regulatory agency negotiations, and technical review of project deliverables.
- Provided engineering and remediation cost evaluations for litigation Projects involving multi-million dollar cleanups which had multiple remedial alternatives to be considered for addressing areas of concern including: disposal pits, lagoons, leachate, buried drums, and leaking tanks.
- Principal-in-Charge responsible for ISRA investigation and remediation at a 31-acre former chemical manufacturing facility in northern New Jersey. Responsibilities included delineation of impacted soils, selection of remedial options; agency negotiations; coordination with existing land owner; installation of engineering controls, including asphalt cap/vegetated cover, and fence. Coordination of deed restriction. Activities resulted in successfully obtaining a No Further Action letter.
- Principal-in-Charge for multi-media remedial investigation at 28-acre chemical manufacturing facility in northern New Jersey. Responsibilities included negotiation of Administrative Consent Order, development of approved Sampling Plans, completion of an approved Remedial Investigation Report, management of human health and environmental assessment, and development of cleanup objectives.
- Principal-in-Charge for a Fortune 500 industrial client during a \$5MM remedial cleanup of PCB-impacted soils to a depth of thirty feet BGS including the design and construction of a 100 gpm temporary ground-water treatment system and injection trench, vertical barriers to 55 feet BGS, and grading plan design and installation of a 2-acre encapsulated area.
- Project Principal for the constructed treatment wetlands system at a manufacturing facility to treat facility stormwater runoff and non-contact cooling water with high zinc concentrations. Constructed wetlands treatment system design included a stormwater pond to provide storage and settling; two

subsurface flow vertical flow cells and a polishing pond. The constructed treatment wetlands system design was retrofitted into existing lagoons for cost savings. Prepared detailed technical specifications and design drawings for bidding and construction in spring 2004.

- Project Manager for design and construction management for 15-acre phytoremediation project to mitigate zinc leachate in a former industrial landfill. Project included planting of approximately 15,000 hybrid poplar trees, willows and several indigenous species on the landfill utilizing augers. Agronomic analyses were performed and appropriate soil nutrients and amendments were added during planting. An irrigation system was installed to provide water to the trees during the initial 3-year maturation period. Eight-foot deer fence was installed to prevent herbivory. Managed all aspects of construction including day-to-day operations of three contractors, field changes and cost tracking. Construction was completed in one month. Continue O&M activities at the site including viability audits for the trees, addition of amendments and nutrients as required, irrigation system inspections and insecticide spraying. The trees have an approximate 90% survival rate.
- Provided project support for conceptual design and evaluation to retrofit innovative stormwater management techniques at a 250-acre site with 24 outfall locations. Candidate technologies included constructed wetlands, phytotechnology, vegetated filter strips, biofilters, engineered soil profiles, porous pavement, green roofs and structural modifications. Utilized stormwater modeling and water balance evaluation as well as site features to divide site into subwatershed management units. Performed regulatory evaluation to identify potentially applicable permits for future stormwater improvement projects. Provided conceptual design, cost estimates, prioritization and recommended capital improvements program and implementation schedule.
- Project Manager for conceptual design to integrate innovative stormwater management techniques into site design for a future manufacturing facility located in Iceland. Stormwater management techniques include engineered soil profiles, constructed wetlands and retention ponds to retain and treat the “first flush” and the 10-year storm. Coordinate column testing program for to design engineered soil profile, work with site design engineers to incorporate innovative stormwater management into facility plan and provide conceptual design drawings and specifications.
- Provided project support for preparing/implementing a rooting test greenhouse study to evaluate the viability of several species under various soil and irrigation conditions for phytotechnology applications at a site in South Carolina. Activities included selection of grass/tree species; construction/set-up of greenhouse rooting test experiment; weekly monitoring; final evaluation and reporting; and recommendations for tree and grass species to be used for various phytotechnology applications.
- Provided project support for preparing/implementing a greenhouse rooting test and toxicity study to evaluate several species under various soil and irrigation conditions at a site in Michigan. Contaminated ground water treated to various levels of TDS was used to irrigate the trees in the study. Activities included selection of tree species; construction/set-up of greenhouse rooting test; weekly monitoring; final evaluation and reporting; and recommendations for pilot study.