

TECHNICAL SPECIALTIES

Engineering Design, Environmental Chemistry, Stormwater Modeling and Analysis, Site Investigation and Remediation, Phytoremediation, Constructed Treatment Wetlands, Wetland & Ecological Assessment & Permitting, Environmental Litigation Support, Expert Witness Testimony.

EXPERIENCE SUMMARY

Thirteen years of experience: Principal, Senior, Project, Staff and Staff Assistant Engineer with Roux Associates, Inc.; Research Assistant with Cornell University.

CREDENTIALS

B.S., Biological Engineering, Cornell University, 2009

M.S., Environmental Engineering and Science, The Johns Hopkins University, 2012

P.E. License - New York

KEY PROJECTS**Stormwater & Hydrology**

- Litigation support for stormwater management and permitting in relation to a new development in upstate New York. Reviewed and commented on stormwater design, regulatory compliance, and impacts to downgradient resources.
- Expert witness for case involving TSS fate and transport in stormwater.
- Designed stormwater retrofits for a Power Plant in Queens, New York to reduce onsite flooding. Modeled existing stormwater system using a hydrodynamic model. Designed catchbasins, resized and re-sloped pipes to meet design goals.
- Evaluated the feasibility of rerouting stormwater at an active petroleum bulk storage facility in Rhode Island. Constructed a hydrodynamic model to evaluate flow through a 6-acre network of storm sewers.
- Designed a constructed treatment wetland, bioswale, and permeable reactive barrier for treatment of BTEX and iron in shallow groundwater and stormwater at a former petroleum refinery in Rhode Island. Developed a hydrologic and hydraulic model to evaluate the effect of increasing discharge to the downgradient stream network. Prepared design drawings, a Remedial Action Work Plan, an Operation and Maintenance Manual, and assisted with permitting.
- Designed stormwater retrofits to reduce aluminum and fluoride discharges at an aluminum smelter. Prepared design drawings for retrofitted drainage swales designed to convey stormwater runoff to a stormwater treatment wetland. The swales were lined with local clay material, found to have the capacity for fluoride sorption.
- Designed a stormwater management plan for a former aluminum smelter during facility decommissioning. Modeled the existing storm sewer

network at the facility. Evaluated different Site decommissioning scenarios and their effect on stormwater. Completed NPDES permit modification.

- Evaluated the feasibility of closing an outfall and rerouting stormwater to an existing lift station and stormwater treatment system at a former chemical manufacturing plant Virginia with elevated metals (zinc and copper) in stormwater.

Landfills & Mining

- Expert witness for the evaluation of environmental response costs and closure costs for eight power plant Sites with coal ash ponds and landfills located in North Carolina and South Carolina. Reviewed and categorized past environmental response and site closure costs. Prepared an expert report.
- Assisted with settlement support by evaluating past and future environmental response costs for a portfolio with 12 coal fired power plants and nine manufactured gas plants throughout the United States. The evaluation included quantification of closure costs for over several CCR landfills and surface impoundments.
- Provided litigation support for a case involving an alumina refinery. Evaluated environmental technical documents and historic records to determine the nature and extent of contamination and sources of contamination at the Site. Evaluated the standard of care for constructing disposal areas in the 1950s and 1970s. Assisted with preparation of an expert report. Provided cost estimating to assist with settlement support.
- Assisted with preparation of an RI/FS workplan for a Superfund Site with several on-Site industrial landfill areas. The workplan included investigation activities to evaluate the design of the landfill liners and caps as well as any impacts on groundwater.
- Designed a stormwater management system retrofit for an MSW landfill in Indiana. Modeled storm events to evaluate stormwater flow under 25-year storms. Sized catch basins, conveyance piping, spillways and retention ponds.
- Assisted with the landfill closure design for an industrial landfill in New York. Completed design for a stormwater management system and assisted with bank stabilization design around the cap.
- Evaluated a landfill leachate treatment system at an MSW landfill in New York. Provided recommendations to improve the treatment system.
- Evaluated an industrial landfill and leachate treatment system at a Superfund Site in Michigan. Made recommendations to retrofit the system to improve leachate treatment.
- Evaluated leachate management strategies and prepared a conceptual design for a closed MSW landfill near Seattle, WA. Evaluated leachate quantity

and quality to assess various treatment technologies, operation sequencing, and discharge requirements for management of leachate on-site.

- Inspected and monitored an alternative cap system for a 34-acre industrial landfill at a former textile manufacturing facility in Virginia.
- Conducted a preliminary design evaluation to address spent pot liner (SPL) leachate at an aluminum smelter. Reviewed groundwater data and eco-toxicity studies as well as academic literature regarding adsorption and precipitation of fluoride and cyanide under different conditions. Used a geochemical speciation modeling to develop a conceptual site model for fate and transport of the SPL leachate and mixing with seawater.
- Prepared future environmental response cost estimates for two former aluminum smelters for an industrial client. Developed costs for multiple remediation scenarios and identified uncertainties and data gaps.

Petroleum & Energy

- Expert witness for the evaluation of environmental costs to address a leaking underground fuel storage tank at a gas station in Kansas. Evaluated necessity and appropriateness of past environmental response costs. Estimated the future environmental response costs required to achieve regulatory closure.
- Assisted with settlement support on a large superfund site on behalf of a petroleum company. Evaluated environmental forensics and assisted with allocation estimates.
- Evaluated the treatability of produced water from several liquid natural gas facilities in Qatar. Reviewed chemical constituents in wastewater and preliminary treatability studies conducted by others. Evaluated draft fate and transport models and made recommendations for improvements. Presented technology overview to Qatar Ministry of Municipality and Environment in Doha.
- Field manager for monitoring of a 43-acre phytoremediation plot in Rhode Island designed for hydraulic control of petroleum impacted groundwater and rhizodegradation of petroleum impacted soil. Completed seasonal inspections and prepared an annual report.

Industrial

- Expert witness for the recovery costs in connection with six sites in Connecticut, Kansas and New York. Sites included gun and ammunition manufacturing facilities, shooting ranges, waste disposal facilities, chemical blending facilities, and a ski manufacturing facility. Site contaminants included metals, PAHs, and CVOCs. Evaluated and categorized past costs.
- Assisted with preparation of an expert report. Evaluated over \$15M of alleged past environmental response costs incurred at a former dry cleaner in

Massachusetts. Allocated past environmental response costs based on extent of contamination and timing of releases. Assisted with preparation of an expert report.

- Evaluated future costs for a former chemical manufacturing facility located in Augusta, Georgia. Contaminants included benzene, chromium, and chlorinated solvents. Evaluated timing and source of environmental contamination.
- Evaluated and categorized over \$44M of alleged past environmental response costs at a former chemical manufacturing facility in New Jersey. The facility was impacted with PCBs, metals, and chlorinated solvents. Assessed the reasonableness of the environmental response actions.
- Evaluated the timing of PCB damage from a Superfund Site to a river. Procured and reviewed historical Site documents, aerials, maps and photographs. Evaluated sediment dating using the radioactive isotope Cesium-137. Assisted with allocation of past environmental response costs. Assisted with preparation of an expert report and a rebuttal report.
- Evaluated the feasibility of retrofitting an existing treatment wetland at a Superfund Site to improve the removal of benzidine, 3,3'-dichlorobenzidine and other Site related constituents to discharge limits specified in a Record of Decision. The existing treatment wetland (designed by others) at the Site had consistently failed to meet treatment objectives. Evaluated design and construction documents, and noted several calculation misassumptions relating to porosity, permeability, and calculation of hydraulic retention time. Evaluated the feasibility of switching media to facilitate greater treatment.
- Prepared a Remedial Action Work Plan for a Brownfield Cleanup Program Site in Queens, New York to address SVOCs and metals in soil and groundwater above unrestricted use cleanup standards. Evaluated the nature and extent of impacted soil and groundwater documented in the remedial investigation. The Remedial Action Work Plan included evaluation of remedial alternatives, preparation of design drawings, cost estimates, a soil management plan, a health and safety plan and a community air monitoring plan.
- Prepared a RCRA Closure Work Plan, a Remedial Action Work Plan, and a Site Management Plan for a former paint factory in Queens, New York. The RCRA closure activities included disposal of over 50 above ground storage tanks and associated piping and power-washing/rinsate sampling floors and walls of the building.

Chlorinated Solvents

- Evaluated the fate and transport of PCE and TCE in groundwater released from two former dry cleaners at a superfund site in New Jersey. Reviewed data on the nature and extent of the solvent plume and the

hydrogeology and groundwater modeling completed by the ACOE, USEPA and their consultants. Assessed the timing of damage from the chlorinated solvent plume to a downgradient property. Assisted with preparation of an expert report.

- Provided expert opinions regarding the nature of the contamination a Site with chlorinated solvent contamination. Evaluated the potential source(s) of contamination and estimated future environmental response costs to reach cleanup goals.
- Expert witness for evaluation of reasonableness of past environmental response costs for a Site with perchloroethylene (PCE) contamination. Evaluated consistency of the environmental response action with the requirements in the National Contingency Plan.
- Evaluated the nature and extent of environmental impacts at a former rubber parts manufacturing facility. Reviewed technical environmental documents and determined the sources of contamination, which included leaks and spills from vapor degreasers, materials loading/unloading areas, and material storage areas. Assisted with preparation of an expert report regarding the nature of releases at the Site.
- Provided settlement support for a drycleaner named as a potentially responsible party at a Superfund Site. Evaluated the historical chlorinated solvent (PCE) use at the drycleaner and the potential release mechanisms. Reviewed environmental reports at the dry cleaning Site as well as the environmental investigation work completed at the Superfund Site. Evaluated the proposed remedial actions for the Superfund Site and estimated future costs. Estimated allocation of costs for the PRPs.

Manufactured Gas Plants (MGPs)

- Evaluated over \$400M of past environmental response costs at seven former manufactured gas plants in New York. Reviewed environmental documents associated with the response actions at the sites. Evaluated the nature and extent of MGP related impacts (coal tar, cyanide, metals, BTEX and PAHs) to groundwater, surface water, soil, and sediment. Assisted with categorization of over 11,000 invoices. Assisted with allocation of past environmental response costs over time and the preparation of expert reports.
- Evaluated past and future environmental response costs for 25 MGPs in the New York City area. Reviewed nature and extent of contamination, and the status of each former MGP in regulatory programs in NYC. Estimated future remedial costs based on the type of contamination and likelihood for redevelopment.
- Provided litigation support for cost recovery at a New York City Brownfield Cleanup Program Site formerly used as an MGP at the turn of the century. Soil and groundwater were impacted with PAHs,

BTEX and NAPL. Remedial activities included excavation, in- situ- stabilization, capping, and product recovery.

Wetland Assessment, Delineation and Monitoring

- Principal-in-charge of wetland delineations and habitat assessments at various Sites to support development and redevelopment activities. Supported delineation of both tidal and freshwater wetlands. Completed assessment of wetland and habitat functions and values. Permitted wetland and wetland buffer area disturbances under various local, state, and federal regulations.
- Project Manager for an 80-acre bank stabilization, grassland mitigation and habitat restoration project at a former landfill in Brooklyn, New York. Field manager for the planting and seeding of the restored habitat areas; including coastal dunes, maritime grasslands, and coastal high marsh and low marsh wetlands.
- Field manager for wetland restoration monitoring at a former telephone recycling facility in Staten Island, New York. Identified vegetation within tidal wetland monitoring plots, and recorded percent cover, stem counts and height measurements for individual plant species.

APPEARANCES

Olin Corporation vs. Lamorak Insurance Company; United States Southern District of New York, Case No. 84 Civ. 1968 (JSR). 2018.

Duke Energy Carolinas, LLC and Duke Energy Progress, LLC. vs. AG Insurance SA/NV, et al.; State of North Carolina Superior Court Division in the Business Court, Case No. 17-CVS-5594. 2020.

George Torres and Roberta Torres vs. Herald Igdaloff, et al., Union Pacific Railroad Company, Third Party Plaintiffs, vs. TSM I, LLC, Third Party Defendants. 2:17-CV-4059-MCS (JEMx). 2021.

State of Maryland Department of the Environment vs. Ecology Services, Inc. Case No. C02CV21000524. 2022.