

William B. Silverstein, P.E., LSRP

Principal Engineer

Technical Specialties:

Chemical and Environmental Engineering; solid and hazardous waste and remediation project management; remediation systems design, permitting and construction management; underground storage tank management; cost estimation/allocation, compliance management and litigation support.

Experience Summary:

30 years experience: Principal Engineer at Roux Associates, Inc.; Previously Associate at RT Environmental Services, Inc.; Project Engineer and Senior Environmental Auditor at Waste Management, Inc. Project responsibilities have included design, permitting, construction and/or closure of widely varied projects including CERCLA ground-water remediation and landfill closure, tank installation and removal, soil treatment, in-situ groundwater treatment, subsurface vapor collection, solid waste landfill design, and hazardous waste landfill closure. Related experience also includes Superfund cost allocation; design, management and permitting of RCRA Treatment/Storage/Disposal facilities; air and water discharge permitting; facility decommissioning; environmental auditing and regulatory compliance management; acquisition evaluation; reserves evaluation, and other environmental investigations. Participating in NJDEP/LSRPA technical committees drafting guidance for LNAPL recovery and USTs.

Credentials:

B.S., 1985, Chemical Engineering, Rensselaer Polytechnic Institute, Troy, New York

Licensed Professional Engineer in multiple states, including Pennsylvania, New Jersey, and others

New Jersey Licensed Site Remediation Professional (LSRP)

New Jersey Certified Subsurface Evaluator

New Jersey Certified Tank Installation/Closure

Patents, Publications and Addresses

- Patent #5,674,424, October 7, 1997, *Thermal Heating Blanket In-Situ Thermal Desorption for Remediation of Hydrocarbon-Contaminated Soil*, Inventors: I. E. T. Iben, W. A. Edelstein, R. B. Sheldon, S. R. Blaha., William Bennett Silverstein, C. R. Scatena., G. R. Brown.
- "Improving the Profitability of Hazardous Waste Landfill Operations", Presented at El Digest Seminar - The Future of Hazardous Waste Management in North America, June 8, 1993.
- "Thermal Blanket for In-Situ Remediation of Surficial Contamination: a Pilot Test", I.E.T Iben, et. al, Environmental Science & Technology, Vol. 30, No. 11, 1996.
- "Field Demonstration of a Full-Scale In-Situ Thermal Desorption System for the Remediation of Soil Containing PCBs and Other Hydrocarbons", Richard B. Sheldon, et. al, Proceedings of Haz-Waste World Expo, Washington, DC, September 1996.
- "Amtrak's Experiences with the Pollutant Minimization Plan Requirements", presented at NJWEA Annual Conference, May 2005, Atlantic City, NJ

Key Projects:**Site Investigation and Remediation**

- Principal Engineer and LSRP for the remediation of PCE impact in soil and groundwater resulting from a former dry cleaning tenant on behalf of one of the nation's largest retail real estate developers. Our client retained Roux Associates for this project as this is one of their largest environmental liabilities and environmental work had to be designed, permitted (including New Jersey Permit-by-Rule authorization), and implemented on a highly accelerated schedule to allow for a large, nationwide tenant to occupy the retail space. Designed and implemented an innovative remedy using pneumatic fracturing and atomized injections of over 200,000 pounds of Zero Valent Iron (ZVI) and 2,500 gallons of Emulsified Vegetable Oil (EVO) to address the chlorinated solvent groundwater plume associated with the site. The remedy was designed as a one-time injection as access would no longer be available for the periodic lactate injection which had been ongoing. The first three post-treatment sample events demonstrate dramatic concentration decreases.
- Technical and regulatory expert for the ExxonMobil Bayonne remediation team. Responsibilities include technical and regulatory leadership of teams conducting petroleum and chromium investigations under the NJDEP ACO. Technical areas have included investigation and remedial planning for hexavalent chromium impacts in operational and non-operational areas, evaluation of petroleum recovery IRMs and planning for transition to long-term remedial actions, remedial action permit modification and preparation of biennial certifications, and investigation of LNAPL and vapor intrusion for off-site properties. Regulatory responsibilities include coordination with the third-party LSRP, ensuring that NJDEP procedures are followed, and identifying/incorporating opportunities to apply professional judgement which are approvable by the LSRP and NJDEP case manager. Also provide regulatory/strategic planning including interpretation of regulatory timeframe and permit requirements and determining the required path/schedule to meet these goals.

Litigation Experience:

- Dorrell, v. Woodruff Energy – Prepared expert report and testified at trial on behalf of defendant Woodruff Energy in litigation related to the sources and causes of alleged heating oil, kerosene, and gasoline releases at the Alloway, NJ General Store. The court found no liability on behalf of defendant Woodruff.
- Delbarton School v ESA - Prepared affidavit of merit and expert reports on behalf of plaintiff, Delbarton School in litigation regarding the appropriateness and cost of a gasoline tank remediation and consultant standard of care. Provided deposition testimony. Case settled prior to trial.
- White Revere v. Super Value Oil Company – Retained by defendant to evaluate source and timing of leaded and unleaded gasoline releases from multiple generations of gasoline tanks and dispensers in order to support cost allocation. Issues included multiple releases straddling the phase-out of lead, introduction of non-MTBE unleaded fuels, and then MTBE-containing fuels. Prepared expert report and provided deposition testimony. Successfully settled at mediation.

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- Soyuzivka UNA Estate v CES – Retained by plaintiff to evaluate the root cause of a release of 20,000 gallons of heating oil from a UST system. Issues included standard of care of the mechanical contractors and fuel oil dealer involved in operation and maintenance of the fuel system.
- Environmental Network Resources Contracting, LLC v. IEW Construction Group, Inc. – Retained by defendant in cross-claim related to standard of care in selection of a disposal site for Acid Producing Soil (APS). Prepared expert report.
- Farmers Mutual v. Est of Santoro – Retained by defendant’s insurer to evaluate the source and timing of a fuel oil release, including rebuttal of plaintiffs theory of a second, long-term release. Settled prior to trial.
- Toms River MUA v. Permapure – Retained by defendant in cost recovery action related to chemical corrosion of asbestos sewer pipe and an associated sinkhole allegedly resulting from acid discharges. Prepared expert report and rebuttal to plaintiffs damages report including evaluation of alternate repair techniques. Case settled prior to deposition.
- Pace v Potenta – Prepared expert and rebuttal report with respect to site remediation cost and timing of releases related to a UST and PCBs allegedly missed in defendant’s Phase I ESA. Settled prior to trial.
- Cornish Enterprises, LLC v American Safety Insurance Co. – Retained to review direct cause of a gasoline release during delivery (transportation incident or UST system failure), and to evaluate response costs and differentiate between present and historic release.
- Kearns v Shotmeyer Bros. Fuel Co., L.L.C. – Retained to review standard of care and liability of the fuel oil dealer in relation to a residential fuel oil release.
- Carl’s Sunoco v One Beacon - Prepared expert and rebuttal report with respect to the source and timing of releases, as well as remedial cost analysis in this insurance coverage action relating to a New Jersey gasoline service station. Settled prior to deposition/trial.
- Wyoming Alaska Company, Inc. v Commerce and Industry Insurance Co. - Provided expert opinion regarding the source and timing and extent of release from gasoline tanks located at a convenience store. Provided technical consultation prior to deposition of opposing experts and prepared an expert affidavit. Settled prior to deposition/trial.
- Peoples Gas – Supported named expert with factual and engineering review of historic Manufactured Gas Plant (MGP) operations. Evaluated manufacturing waste and residual quantities historically generated based on site-specific factors and published sources.
- Columbia Gas v. London Market – Prepared remediation cost estimates for London counsel for an extensive portfolio of Manufactured Gas Plant (MGP) sites, pipeline stations and other utility facilities, based on site features, age, present extent of site investigation and other available information. Prepared critique of Columbia’s expert’s cost estimate and underlying remedy assumptions.
- Boston Gas Company – Prepared remediation cost estimates and site summaries for a portfolio of New England MGP sites in support of insurance claim evaluation. Subsequently provided deposition testimony regarding investigation procedures and scope of work as a fact witness in Boston Gas Company v. Century Indemnity Company.
- Morrison v. McAllister - Prepared an expert review of the appropriateness and cost of response actions to a residential AST release in defense of a fuel supplier. Litigation was successfully settled, and Roux Associates proceeded with the remainder of site remediation using alternative measures to avoid the previously proposed demolition of the residence.
- Prepared an expert report describing the cause of failure of a basement oil tank on behalf of the homeowner plaintiff in a cost recovery action against the fuel supplier. The oil dealer had initially refused to deliver based on inspection of vent pipe configuration, then proceeded to deliver resulting in tank failure.
- Riggins, Inc. v Hartford, et al. - Prepared expert reports and rebuttals for an insurance carrier client with respect to an ongoing litigation involving a portfolio of Riggins gasoline service stations in southern New Jersey.
- Forcone v Merrimac – Performed in-situ remediation of a residential heating oil release on behalf of the homeowner insurance carrier. Provided deposition testimony in a subrogation matter regarding petroleum release date and cost of remediation conducted. Testified at trial as a fact witness regarding remediation cost on behalf of the insurer in subrogation (New Jersey Superior Court, Atlantic County).
- Marsh Supermarkets, Inc. v. The Travelers Indemnity Company - Prepared expert analysis of remediation costs for a portfolio of convenience store gasoline tanks in Indiana on behalf of insurance carrier defendant.
- Kalkstein v. Petrunis – Retained by defendant insurance carrier as an environmental remediation expert in an action relating to a residential heating oil remediation. Subsequently conducted site cleanup and provided deposition testimony separately as a remediation expert and fact witness as to the remediation work conducted.
- Provided consultation on the respective liability of a cleanup contractor and other parties for contamination remaining after the catastrophic failure during closure of a previously leaking gasoline tank. This project involved a review of documents and preparation of a report regarding the relative contribution of involved parties to the cause and potential exacerbation of a petroleum release. Key issues included pre-existing contamination, pre-release actions of the owner, contractor and engineer, and post-release remedial actions and cleanup methods.
- Reviewed past and future remedial costs for a group of six Matlack tank truck terminal sites on behalf of an insurance Joint Defense Group. Prepared an analysis of the most likely remedial scenario and cost for each site, and presented findings to the Defense Group and the Insured. Defended the

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alternative cost estimates at mediation, leading to successful settlements with all parties.

- Provided settlement support to a state insurance guaranty fund with respect to a residential fuel oil release. The project involved review of the reasonableness of remediation expenditures, as well as technical evaluation of the date of the release. The work included technical critique/rebuttal of the application by another consultant of the Christensen and Larsen release dating method, as well as analysis of other site facts relevant to dating of the release.
- Prepared an expert report in defense of a mechanical contractor with respect to the cause and remedial cost of a release from an aboveground heating oil distribution AST. Evaluated initial spill response costs and the proposed excavation remedy. Evaluated alternative remedial options to avoid costly replacement of the AST tank farm and loading rack.
- Participated in a team of technical, financial and toxicology experts to establish an equitable cost allocation among over 300 parties for the Oswald/Dorney Road Landfill Superfund Site. This work involved review of site records, and development of a methodology for an equitable waste strength ranking scheme. The ranking system and detailed allocation spreadsheet was used by the Federal District Court in establishing the allocation between parties, and has been adapted for use at other similar sites. The project also included evaluation of historic landfill closure practices over time, in order to support the litigation effort.
- Contributed to technical rebuttal to expert reports and preparation of a waste-strength-based allocation on behalf of one industrial PRP at the Buckeye Landfill CERCLA Site. Key issues included the relative contribution of the landfill itself and the surrounding mining residue, as well as the relative contaminant contribution of the various industrial wastes disposed within the landfill. Prepared technical rebuttal to expert reports prepared on behalf of both the site owner/mine waste generator and other industrial PRPs.
- For the Novak Landfill Superfund Site, coordinated work among experts in the application of the Oswald/Dorney Road waste strength ranking methodology to develop an allocation leading to successful settlement with all parties. Work involved identification of hazardous substances in identified municipal and industrial waste streams, development of key characteristics of each waste stream, analysis of anticipated site closure costs, and calculation of the resulting allocation among hundreds of PRPs.
- Samuel, Son & Co., Ltd. v. Pennsylvania National Mutual Casualty Insurance Company, et al. – Prepared expert report and amended expert report and provided deposition testimony on behalf of an insurance carrier defendant. Provided opinions regarding source and timing of chlorinated solvent releases.
- AluChem tax appeal – Prepared expert report regarding environmental remediation liabilities and provided testimony at tax hearing.
- Lombard Swim Club – Provided expert testimony at arbitration on behalf of defendant. Issues included source of subsurface water seepage and appropriateness/cost of response actions.
- NJDEP v. IGI – Testified in administrative law hearing regarding hazardous waste removal action.

Cost Evaluation, Insurance, and Allocation/Settlement Support

- Penn Fuel Gas - Performed settlement support in the form of technical and financial review of claims against insurance companies for environmental investigation and remediation of 24 former manufactured gas plants in the eastern United States. Reviewed the technical and regulatory basis for the completed and proposed actions, and prepared a cost estimation spreadsheet, including comparison of claimed and estimated costs. Prepared a claim review which identified existing regulatory programs and guidance which, if followed, would result in significant savings for site closure over the proposed strategy.
- Prepared a draft Environmental Claim Evaluation Report for a group of five Midwestern refineries. The evaluation considered the appropriateness and cost-effectiveness of the proposed remedial actions, as well as regulatory framework under which remediation was being conducted. Issues considered included normal RCRA closure cost vs. remedial costs, and cost savings associated with risk-based State voluntary cleanup approvals, as compared to worst-case excavation-intensive remedies.
- Prepared environmental reserves cost estimates for a portfolio of chemical and equipment manufacturing and distribution facilities. Conducted both initial site reviews and annual cost updates in support of SEC reporting under Sarbanes-Oxley requirements. Prepared a standardized cost estimate format and consolidated review of portfolio costs based on data collected by other auditors. Incorporated newly acquired facilities with and without existing reserves into the program.

Site Remediation Projects:

- Remediated a mixed leaded/unleaded gasoline plume (BTEX/MTBE) at a central New Jersey volunteer fire company. Implemented Soil Vapor Extraction/Air Sparge remediation for the on-site source area resulting in successfully meeting soil and groundwater standards. The off-site portion of the plume was commingled with a down gradient residential heating oil release. Remediation of this portion of the plume included a jointly funded biological remediation of the combined gasoline/heating oil plume, which is nearing completion.
- Conducted remedial investigation and remediation of a New Jersey dry cleaner site. Investigation under the New Jersey Licensed Site Remediation Professional (LSRP) Program included overburden and bedrock groundwater investigation and evaluation of upgradient sources of deep bedrock impact. Remedy included excavation beneath the source area, application of regulatory Attainment Guidance to close out large areas of low-level impacts, and off-site source evaluation.
- Implemented remediation of a Perchloroethene (PCE) distribution facility using Electrical Resistance Heating (ERH) and excavation around a high pressure gas transmission pipeline.
- Designed an innovative In-Situ Thermal Desorption (ISTD) soil treatment system for remediation of PCB contaminated

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soils at a site in New York. The system vaporizes PCBs contained in the soil and then collects and treats the PCB vapor in a trailer-mounted flameless thermal oxidizer. The project involved supervision of construction of the mobile treatment equipment and conducting a full scale treatment demonstration under a TSCA Demonstration Permit. The work involved coordination with NYSDEC, as well as the USEPA Region II RCRA and TSCA groups and the USEPA Chemical Substances Control division in Washington. The work resulted in the issuance of United States Patent #5,674,424, as well as a draft Nationwide Operating Permit under TSCA.

- Residential Storage Tank Program Manager for the Roux Associates New Jersey office. Responsible for hundreds of residential underground storage tank investigations/remedial actions on behalf of insurance carrier clients. Projects include initial claim evaluation; coordination of emergency response; investigation of the extent of release to soil and groundwater; identification of the cause and timing of release to support insurance coverage and cost allocation decisions; and implementation of conventional and innovative remedial technologies.
- Estimated and evaluated environmental remediation costs for numerous sites in the context of insurance claim analysis/settlement support, as well as Sarbanes-Oxley environmental reserves audits.
- Closed numerous underground storage tank systems, including closure notification/permitting, field inspection, reporting and remedial action. Projects have included commercial and residential heating oil, other CERCLA hazardous substances and hazardous wastes.
- Managed design, construction, startup and operation of a 160 GPM CERCLA ground-water recovery and treatment system. The system incorporated fixed film biological treatment of non-chlorinated and chlorinated contaminants. Also designed and constructed plant expansion, vapor extraction system, and leachate metals pre-treatment system. Negotiated NPDES permit limits for direct discharge to an adjacent stream.
- Managed the conceptual design and laboratory and field pilot testing of an in-situ groundwater treatment remedy for a chlorobenzene and dichlorobenzene plume in northern New Jersey. The treatment process consists of oxygen injection into overburden and fractured bedrock, combined with injection of nutrients and cultured site microbes.
- Evaluated the integrity of abandoned asphalt storage tanks in conjunction with a Coast Guard emergency response to a release from an abandoned facility.
- Managed remedial design and construction of CERCLA landfill unit closure. The project included the first geobentonite composite cap approved by USEPA Region III, as well as perimeter leachate collection and treatment, removal of waste from adjacent railroad and turnpike rights-of-way, isolation of an active 36" water main, slope stabilization and stream bank protection. Prepared an options analysis to identify an appropriate technology for remediation of hexavalent chromium impacts to soil and groundwater for a former chromium pigment manufacturing plant located near

Allentown, Pennsylvania. Conducted a series of laboratory jar tests in order to evaluate the effectiveness of several pre-screened reducing agents. Roux Associates then conducted a single-well reagent injection to confirm design parameters, to be followed by the full-scale treatment program.

- Conducted free product recovery pilot tests at a northern New Jersey rail yard 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 and operated the final systems.
- Managed permitting and field implementation for a demonstration of the In-Situ Thermal Desorption technology at a former San Francisco Bay Area Naval Shipyard. Approvals were obtained from the US Navy, the Bay Area Defense Conversion Action Team, the Bay Area Air Quality Management District, USEPA Region IX, and several divisions of the California EPA.
- Designed active landfill gas management systems, including well design, HDPE collection header, condensate management, and blower/compressor/flare stations for a number of landfill sites across the country. Projects included monitoring and evaluation of subsurface methane migration, calculating gas production rates, and specification of gas venting and recovery systems. Coordinated design and construction with end users of landfill gas, including electrical generation and other beneficial re-use.

Treatment System and Facilities Design and Decommissioning:

- Managed 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 corporate zero discharge goal.
- Managed the RCRA closure of an industrial wastewater treatment plant for an industrial client. The project included removal of remaining equipment and concrete structures, pressure washing and confirmatory analysis of remaining structures, select building demolition and restoration of affected utilizes. Prepared and certified the RCRA closure report and worked with both state and local code officials to close out the facility consent order and obtain certificate of occupancy, leading to sale/reuse of the facility.
- Managed a multi-million dollar building decommissioning project at a former defense aerospace manufacturing facility. The project involved remediation of PCBs, lead, chrome, mercury, and asbestos in interior research and manufacturing areas.
- For a manufacturer of asbestos/phenolic resin friction products, prepared comprehensive scope and cost estimates for facility decommissioning and demolition. Negotiated with township officials and state regulators regarding scope of work for closure of former landfill, transfer and redevelopment of the property, redesignation of remediation trust funds and penalties and filing of grant applications to facilitate the closure and redevelopment process.