Corporate Engineering and
Manufacturing Technology Services Division
Pfizer Inc
235 East 42nd Street
New York, NY 10017-5755
Tel 212 573 2323
Fax 212 573 7365 Fax 212 573 4442

May 18, 1994

Mr. Dave Rubinton, Esq.
NYS Department of Environmental Conservation
Eastern Field Unit
200 White Plains Road, 5th Floor
Tarrytown, NY 10591-5805

Re: Pfizer Inc
Order on Consent
Index No. W2-0258-88-12
Site # 2-41-007

Dear Mr. Rubinton:

In accordance with paragraph XIV.A. of the above referenced Order on Consent (Order), this letter transmits Qualification & Experience Summaries for contractors Pfizer Inc (Pfizer) has retained to assist in meeting the obligations required by the Order. The contractors and their responsibilities are as follows:

- Roux Associates, Inc. - Engineer for Groundwater System (See Attachment A);
- Ebasco Environmental - Engineer and Construction Manager for Soil Remediation (See Attachment B); and
- Lehrer McGovern Bovis, Inc. - Construction Manager for Groundwater System and Client (Pfizer) Representative for Soil Remediation (See Attachment C).

Should Pfizer retain additional contractors, their Qualification & Experience Summaries will be submitted to you. Summaries for subcontractors retained by Pfizer contractors will be provided on request.

Please contact me if you have any questions.

Sincerely,

Steven F. Kemp

Steven F. Kemp

cc: Shaminder Singh, NYSDEC
Carol A. Casazza, Pfizer
John L Greenthal, Nixon, Hargrave, Devans & Doyle

ATTACHMENT A

Statement of Qualifications

ROUX ASSOCIATES INC.
Environmental Consulting & Management

ROUX

OFFICE LOCATIONS

REGIONAL OFFICES

New York — Long Island
(Headquarters)
1377 Motor Parkway
Islandia, New York 11788
(516) 232-2600
Contact: Douglas Swanson
Paul Roux, President

New Jersey — Philadelphia
1222 Forest Parkway
Suite 190
West Deptford, New Jersey 08066
(609) 423-8800
Contact: Patrick Penders
John Loper, V.P.

Colorado — Denver
1401 17th Street
Suite 400
Denver, Colorado 80202
(303) 298-9445
Contact: Timothy Baumann
William Sarni, V.P

California — SF Bay Area
1855 Gateway Boulevard
Suite 770
Concord, California 94520
(510) 602-2333
Contact: Steven Anderson, Dir.

RISK ASSESSMENT GROUP

Georgia — Atlanta
1926 Northlake Parkway
Suite 102
Tucker, Georgia 30084
(404) 270-5145
Contact: Simon Lock, Ph.D., DABT

INTRODUCTION

ROUX ASSOCIATES is an Environmental Consulting & Management firm which is retained by major corporations and law firms across the country. The firm provides complete project management services, including:

- Environmental Compliance Audits
- Regulatory Negotiations
- Subsurface Investigations (soil and ground water)
- Remediation Design & Construction Management
- Water Supply Development
- Litigation Support & Expert Testimony
- Health & Environmental Risk Assessments
- Industrial Hygiene Audits

ROUX ASSOCIATES is involved with many high-visibility projects – most of which are driven by CERCLA, RCRA, UST, FIFRA, and Property Transfer regulations. We are currently involved with the RI/FS at the #5 site on the USEPA National Priorities list, the largest reported underground PHC release in the nation, an East Coast divestiture program for a major oil company, and Superfund sites in Massachusetts, Connecticut, New York, New Jersey, Delaware, Florida, Tennessee, and California.

ROUX ASSOCIATES consults primarily for industry and derives most of its work from repeat clients and client referrals. Our current client list includes major companies in the chemical, mining, petroleum, pharmaceutical, utility, consumer product, computer, paper, and waste disposal industries. We also serve small to mid-sized firms in a wide range of manufacturing, development, and service industries.

OUR SUCCESS is attributed to understanding the objectives of our clients, and then implementing a game plan with high-caliber project managers and technical staff. Our interest is to serve the management needs of our clients–which often means moving projects through the regulatory process with a constant eye towards achieving site closure. This has been our formula for winning the trust and confidence of our Fortune 500 clients, who return to us with environmental projects at sites across the country.

THIS QUALIFICATIONS STATEMENT provides an overview of ROUX ASSOCIATES' services, personnel, equipment, clients, project experience, and detailed qualifications of senior staff members. Additional information about the firm will be provided upon request.

ENVIRONMENTAL MANAGEMENT SERVICES

By Regulatory Compliance Sector

- CERCLA Remedial Investigations/ Feasibility Studies
- Underground Storage Tank Compliance Programs
- Site Assessments Prior to Acquisition or Divestiture (Property Transfer Assessments)
- Pesticide Investigations for FIFRA Compliance Programs
- RCRA Facility Monitoring, Assessments, and Closure Plans
- Environmental Compliance Audits

By Professional Expertise Offered

I. Environmental Compliance Services:

- Pre-Audit Planning
- Facility Inspection & Data Collection
- Audit Evaluations

II. Ground-Water & Soil Investigations & Remediation:

- Water Supply Development
- Environmental Impact Statements
- Contaminant Transport and Impact Assessments
- Ground-Water Modeling
- Hazardous Waste Site Monitoring
- Regional Hydrogeologic Assessments
- Geophysical Investigations
- Ground-Water Discharge Permit Investigations
- Soil and Sediment Sampling
- Treatment Feasibility Studies
- Treatment System Design, Construction Management, and Monitoring
- Landfill, Lagoon, and Surface Impoundment Investigations and Remedial Programs

III. Health & Environmental Risk Assessment:

- CERCLA & Superfund Investigations
- Property Transfer Assessments
- Permitting Support/Zoning Support
- Litigation Support/Expert Testimony
- Environmental Liability Insurance
- General Toxicological Services

IV. Litigation Support

- Expert Testimony
- Records Review
- Distinguishing Contaminant Sources
- Evaluating Remedial Actions
- Allocating Responsibility to Contributors
- Preparation of Technical Maps
- Evaluation of Toxicological Characteristics
- Rebuttal of Technical Reports

V. Occupational Health & Safety

- Industrial Hygiene Surveys
- Health & Safety Audits
- Professional Training Programs: Hazardous Waste Operation; Respiratory Protection; Hearing Conservation; Hazard Communications.

PERSONNEL

TO EFFECTIVELY MANAGE our wide range of projects, the professional staff at ROUX ASSOCIATES is trained and experienced in the fields of hazardous waste management, geology, hydrology, hydrogeology, geochemistry, chemical engineering, environmental engineering, toxicology, computer modeling, data management, and statistical methods. Senior staff members average over 10 years of ground-water and related environmental consulting experience.

SENIOR PERSONNEL are fully familiar with environmental laws and regulations and participate in regulatory agency negotiations on behalf of industrial clients. To date, senior ROUX personnel have negotiated with regulatory agencies in over 20 states. In addition, staff members provide expert testimony at hearings and at adversarial legal proceedings relating to ground-water, toxicological, and hazardous waste issues.

FIELD GEOLOGISTS AND TECHNICIANS are trained and experienced in drilling supervision, geologic logging, design and installation of monitoring wells, sludge sampling, soil and water sample collection, pumping tests, water-level measurements, geophysical surveys, health and safety procedures, and a full range of in-situ testing techniques.

ROUX ASSOCIATES ENGINEERS are experienced with remedial methods for impacted soil and ground water, and they select and design the optimum approach for each individual problem. Senior personnel are also experienced at managing large and complex cleanup operations.

PROFESSIONAL PROFILES of ROUX ASSOCIATES' senior staff are included in the last section of this qualifications package.

EQUIPMENT

Hydrogeologic Field Equipment: ROUX ASSOCIATES maintains a wide variety of hydrogeologic field equipment for well purging, aquifer testing, and sampling; well elevation surveying; ground-water flow determination; air and vapor flow determination; soil gas and water quality measurements; soil, sludge, and leachate sampling; stream sampling; electrical resistivity surveying; electromagnetic conductivity surveying; and measurement of volatile organic compound vapors.

Health and Safety Equipment: Included are combustible gas meters, portable vapor analyzers, respirators, protective clothing, personal sampling devices, and a digital dust monitor. Field personnel have been trained in the use of this equipment, and have completed a 40-hour OSHA training course.

Computers and Software: The company owns a host of Series 286 and Series 386 IBM and IBM compatible computers and a multitude of software packages for statistical analysis, data management, numerical analysis, flow and transport modeling, AutoCAD and geophysical data interpretation. Computer generated graphics and desktop publishing techniques (Apple MacIntosh and MS DOS applications) are used where appropriate in report preparation.

Subcontracted Equipment & Services: Contaminated soil and ground-water removal or on-site treatment services, along with well drilling, deep soil boring, surveying, and laboratory analytical services, are subcontracted as necessary. ROUX ASSOCIATES has developed excellent working relationships with many subcontractors, and typically requests quotations from several qualified subcontractors. The client may, of course, have any degree of input regarding the selection of subcontractors.

PARTIAL CLIENT LIST

Corporate

Amtrak
American Salt Company
ARCO Products Company
Burlington Northern Railroad
Brooklyn Union Gas Company
Carter Wallace, Inc.
Chesebrough-Pond's Inc.
Ciba-Geigy Corporation
Crown Cork and Seal
DAP Inc.
Data General Corporation
Exxon Company USA
FMC Corporation
Formosa Plastics Corporation
Gates Rubber Company
General Host Corporation
Getty Petroleum Corporation
Gulf & Western Manufacturing Co.
Hercules Incorporated
ICI Americas Inc.
Inland Steel
Manville Sales Corporation
Mineral Technology Inc.
Mobil Oil Company
Monsanto Company
Moore Business Forms
National Helicopter Corporation
Nabisco Brands Inc.
Northern Telecom
NYNEX Enterprises
Pennzoil
Pfizer, Inc.
Phillips Petroleum Company
Praxair, Inc.
Rhone-Poulenc Basic Chemicals Co.
ER Squibb & Sons, Inc.
Stauffer Chemical Company
Texaco USA
TRW, Inc.
Unocal
Union Carbide Corporation
Unisys Corporation
United Technologies Corporation
Univar
US Air
Valent
Witco Corporation
Zeneca, Inc.

Government

Brookhaven National Laboratory
Commonwealth of Massachusetts
State of New York

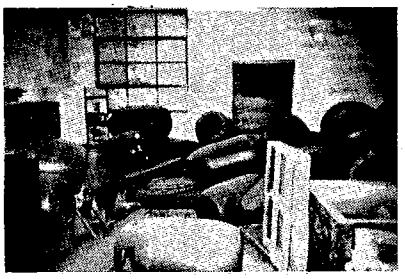
Others

Water Supply Companies
Consulting Engineering Firms
Law Firms
Municipalities

SUPERFUND INVESTIGATIONS

ROUX ASSOCIATES has extensive experience in performing CERCLA and SARA RI/FS's for clients nationwide. We are involved in the investigation and monitoring of several prominent Superfund sites across the country. The scope of services we provide to our clients on Superfund projects includes:

- Technical Support During Negotiations
- RI/FS Work Plan Preparation
- All Hydrogeological, Risk Assessment, and Other Investigative Activities
- Subcontractor Management
- Remediation Implementation
- Report Preparation
- Litigation Support Activities



Careful planning and coordination allow us to move efficiently towards a cost-effective remedy which suits the needs and goals of our clients. A summary of our role in several key Superfund projects is presented in this section.

Industri-Plex Superfund Site, Woburn, Massachusetts:

ROUX ASSOCIATES performed the Remedial Investigation (RI) and portions of the Feasibility Study for this site (1982-1985), which was one of the first Superfund site investigations and is currently ranked #5 on the USEPA National Priorities List (NPL). ROUX ASSOCIATES negotiated, planned and supervised subsurface investigations across 300 acres. Included in the investigation were an extensive electromagnetic survey, collection of over 2,000 soil samples from test pits and borings, and installation of 24 monitoring wells. A Phase I report interpreting all data collected was submitted in 1983. A Phase II report, including recommended remedial actions, was submitted in 1984. Additional work, including a wetlands/floodplain assessment and subsurface evaluation has been completed. The RI/FS was accepted, and Record of Decision (ROD) was issued by USEPA.

ROUX ASSOCIATES was recently selected (1989) by the lead PRP as a member of the design team for the ground-water remediation program, as part of the site remediation required under the Record of Decision. Furthermore, in 1991, ROUX ASSOCIATES completed a regional evaluation of ground-water, surface-water, and stream sediment quality around the Industri-Plex site. The evaluation was summarized in an RI report and is being used to support an FS for the study area. Supplemental evaluations are currently underway regarding stream sediments, geochemical treatability studies, and ecological evaluations.

Shore Realty USEPA Superfund Site, Glenwood Landing, NY:

ROUX ASSOCIATES completed the Remedial Investigation on behalf of a group of over 50 third-party defendants. The FS is being conducted by ROUX ASSOCIATES at this time. The RI included the installation of monitoring wells, the collection and analyses of soil and sediment samples, a soil gas survey, a magnetometer survey, and the preparation of an RI report. The FS includes additional field investigations, a pilot soil venting remedial program, and preparation of an FS report.

Comprehensive Risk Assessment for USEPA Superfund Feasibility Study in New York:

ROUX ASSOCIATES conducted a comprehensive risk assessment during a Superfund FS to determine potential risks associated with future land use at the site. Ethylbenzene, toluene, and xylene (ETX) were detected in soils. It was assumed that benzene was also present (due to knowledge of site history), but that its detection was masked by the presence of high ETX concentrations. Chlorinated solvents were detected in ground water, but their lack of detection in soils indicated that they originated from an off-site source. Sediments from adjacent tidal flats revealed site-related compounds.

Exposure scenarios considered included industrial and commercial development, recreational use by adults and children, and long-term residential occupation. Exposure (human and ecological) to sediments on tidal flats was considered. Based on the risk assessment, cleanup recommendations were presented which would provide long-term protection to human health and the environment.

Litigation Support at California Hazardous Waste Site:

ROUX ASSOCIATES was retained in 1990-1991 by the California office of a prominent law firm to provide litigation support and expert witness in a Superfund private action case. The site at issue is a hazardous waste site in Santa Clara, California, in which chemicals were manufactured, blended, and distributed by various tenants who leased the property from various owners. The current owner filed suit against former owners and tenants to recover costs for the investigation and cleanup. Representing one of the prior tenants, ROUX ASSOCIATES assembled a team of interdisciplinary professionals to read numerous depositions and reports, and to develop a set of opinions regarding present site conditions, contaminant sources, and environmental history of the site. The environmental history documented when and how the releases occurred and spread. A series of exhibits were prepared to support and explain the opinions. Deposition testimony was given by ROUX principals. The client was able to settle prior to trial.

Delaware City USEPA Superfund Site:

ROUX ASSOCIATES performed the RI and soil/ground-water portions of the FS at a PVC plant site on behalf of the former site owner. Over 30 wells were installed and sampled to fully map the extent of the plume. An electrical resistivity survey of a four square mile area was conducted to determine the continuity of a clay aquitard beneath the plume. Three dimensional ground-water flow patterns were determined as part of the study. The remedial investigation report was submitted in 1983, and remedial action feasibility studies have been completed. A report was submitted to USEPA Region III and the Delaware DNREC. USEPA accepted the RI/FS and issued a Record of Decision. ROUX ASSOCIATES designed and installed a ground-water intercept system in response to the EPA-selected remedy. The ground-water remediation system began operation in January 1990.

RI/FS at New York Chemical Facility Begins in 1991:

ROUX ASSOCIATES negotiated, prepared, and submitted to USEPA an acceptable RI/FS scope of work plan for two PRP's (owner and tenant) at an NPL Superfund site in New York. Investigations will include site history examinations, air photography interpretations, drilling of multiple-depth wells, surface soil sampling, sediment sampling, borehole soil sampling, slug testing, ground-water sampling, and water level measurements.

New York State Superfund Site, Modena, New York:

ROUX ASSOCIATES coordinated and carried out a soil and ground-water sampling program, data analysis, and hydrogeologic assessment report. Based upon this work, ROUX ASSOCIATES was selected by the site owner to conduct a RI/FS for the property. The work plan for the RI/FS has been approved by the NYSDEC. The RI and preliminary stages of the FS are currently underway.

Risk Assessment of Metals in Soils at a New York State Superfund Site:

ROUX ASSOCIATES evaluated the potential risks associated with metals in surficial soils at a New York State Superfund site. An initial screening detected elevated

levels of metals associated with the metals plating facility at the site. Exposure scenarios were developed considering land usage for recreational purposes and for residential crop production. Deer grazing at this rural site was also considered. 'Hot spots' of mercury and arsenic in surficial soils clearly presented a long-term risk under the residential crop scenario. Remedial action was recommended to eliminate potential exposure from the 'hot spot' areas.

25 Inactive Hazardous Waste Sites in New York:

ROUX ASSOCIATES provided preliminary assessments at 25 inactive Superfund hazardous waste sites in New York State. Surface geophysical methods were employed to locate buried metallic objects (which might be encountered during drilling), to detect conductive plumes, and to assess geologic variations. Geophysical methods included terrain conductivity, magnetometry, and resistivity.

RI at Connecticut Superfund Site:

ROUX ASSOCIATES completed a Phase 1 and Phase 2 Remedial Investigation for a Connecticut manufacturing site which was recently placed on the Superfund list. Over a dozen private water supply wells in a sole source aquifer system were impacted by chlorinated solvents. The scope of work included investigating waste, surface water, ground water, soil, and bedrock. ROUX ASSOCIATES completed soil borings, test pits, installation of bedrock wells, performance of aquifer tests, sampling of lagoons and dry wells, and installing piezometers in wetlands. Data from all affected wells has been evaluated, and a remedial system will be designed.

USEPA Superfund Site in Tennessee:

ROUX ASSOCIATES performed a large-scale hydrogeologic investigation of a multiple aquifer system including fractured limestone rock, which underlies an industrial facility in Tennessee. The work included the installation of multiple depth piezometers, pumping tests, ground-water quality evaluations, and the development of a flow model for the system.

Superfund Settlement Litigation Support:

ROUX ASSOCIATES was retained by a law firm to summarize and evaluate an extensive amount of existing data for a major New Jersey Superfund site. This work is ongoing, and is being performed as part of litigation support for the site cleanup.

7 Phase II Site Assessments at New York State Superfund Sites:

ROUX ASSOCIATES characterized soil and ground-water quality at seven New York State Superfund sites in order to determine scores for the state's Hazard Ranking System. As part of these Phase II site assessments, the company installed monitoring wells, sampled sediment and waste, and analyzed site-specific hydrogeologic data.

Technical Review of Another Consultant's Investigation:

ROUX ASSOCIATES was retained by an attorney representing a state Superfund case to review all technical information prepared by another consultant. Areas of concern were cited, and recommendations for subsequent work were presented.

Tybouts Corner Landfill, Delaware:

ROUX ASSOCIATES evaluated an RI/FS conducted by a USEPA contractor at the #2 Superfund Site on the National Priorities List. The purpose of the project was to provide an independent assessment of USEPA's conclusions and remedial plan for the principal PRP.

Acton Superfund Site, Acton, Massachusetts:

ROUX ASSOCIATES investigated the sources of 1,1,1-trichloroethane and other organic chemicals impacting a municipal supply well. Several potential sources were identified and previous findings by other consultants were in conflict. The ROUX ASSOCIATES investigation was designed to resolve these conflicts through a detailed examination of ground-water flow and solute transport in the area of the contaminated well and by tracking the plume(s) of contaminants to their source.

New York State Superfund Site, Long Island, NY:

ROUX ASSOCIATES conducted a Phase II hydrogeologic investigation involving metals and organic compounds in ground water. Nearby supply wells withdraw large volumes of water for consumptive use, thus locally affecting the horizontal and vertical components of ground-water flow. A final report was submitted.

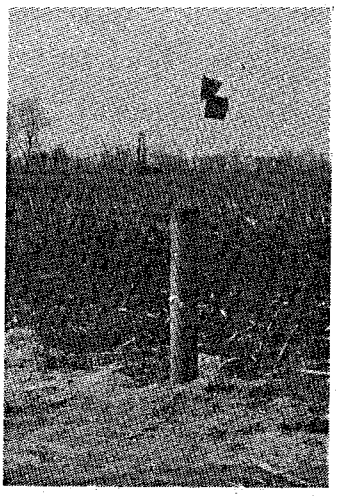
New Jersey State Superfund Site:

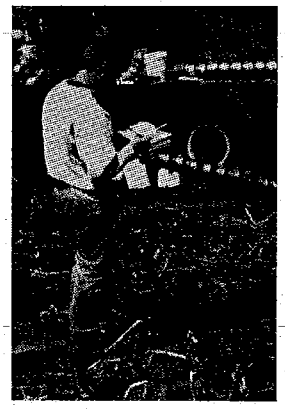
ROUX ASSOCIATES evaluated design and cost factors for various treatment systems to remove heavy metals from ground water. The optimum design recommended was based upon present worth costs and performance considerations.

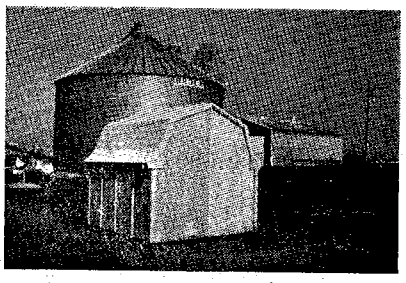
AGRICULTURAL CHEMICALS

ROUX ASSOCIATES is at the forefront of investigating pesticides in the environment. No other consulting firm has developed the scope and depth of experience that we have in pesticide monitoring and evaluation. Our Pesticide Projects Group conducts all EPA-mandated studies, including:

- Large-Scale Retrospectives
- Small-Scale Retrospectives
- Small-Scale Prospectives
- Point-Source Investigations
- Sensitivity Analyses







All of our Agricultural Chemical Programs follow Good Laboratory Practices (GLP) as required by USEPA under FIFRA. A representative sampling of the scope of our pesticide work is presented in this section.

Response to USEPA Special Data Call-In:

ROUX ASSOCIATES was retained to prepare a summary of monitoring data on a pesticide occurrence in surface water and ground water. The summary was structured using USEPA specified formats. The collected data were reviewed, tabulated, and entered into dBase III using a screen entry program designed by ROUX ASSOCIATES. The data base included site locations, Good Laboratory Practice field/analytical procedures, determination of the possible transport pathway to ground water or surface water, and concentrations of nitrates, for each sample.

Additional Data Collection for USEPA Special Data Call-In:

ROUX ASSOCIATES conducted a project to collect additional data beyond what was reported in the literature on the detections of a herbicide in drinking water wells in response to a Special Data Call-In issued to our client. Tasks included: contacting primary researchers and state regulatory agencies; collecting detailed data on well location, construction, herbicide use areas, and analytical programs; visiting impacted wells to attempt to determine transport pathway to ground water; compilation of data; preparation of site maps; data formatting to dBase III, and reporting of findings.

Special Data Call-In for Different Pesticide:

ROUX ASSOCIATES assisted a client in responding to a USEPA request for ground-water and surface-water data on a herbicide. Literature was collected and summarized according to the headings required by USEPA. Monitoring data were entered into dBase III and reported to the client and USEPA.

Small-Scale Retrospective Study:

ROUX ASSOCIATES assisted a client in the negotiation process with USEPA regarding the number of sites to be included in the study, and then wrote the study protocol, which was approved by the agency. ROUX ASSOCIATES then selected appropriate sites and installed monitoring wells at farms/groves which used the pesticide. The project is in progress.

Sensitivity Analysis for Herbicides:

ROUX ASSOCIATES determined sensitive hydrogeologic areas across the country for the application of herbicides. The project was designed to determine the ability of selected herbicides to leach into ground water in areas underlain by permeable soils, vadose zones, and aquifers. Ten sensitive areas were selected from coast to coast and individual farm/grove sites were visited. Monitoring wells were installed, and a soil boring and ground-water sampling program was conducted. This study was a precursor to EPA's Small-Scale Retrospective Study.

Vulnerability Ranking of 500 Counties in 34 States:

ROUX ASSOCIATES evaluated the soil and hydrogeologic characteristics of approximately 500 counties in 34 states to identify areas vulnerable to ground-water contamination by surface-applied agricultural chemicals. A quantitative method of ranking the most vulnerable counties was devised and applied to identify priority sites for ground-water monitoring. Agencies in agricultural states were surveyed to obtain information on pesticide monitoring data and programs. A detailed analyses of the soil and geology was performed in counties where pesticides have been detected in ground water. ROUX ASSOCIATES participated in the client's presentations to USEPA and to the USEPA Science Advisory Panel. The results of these vulnerability analyses are the basis for subsequent targeted ground-water monitoring programs.

Surface Water Monitoring Program:

ROUX ASSOCIATES designed and implemented a stream monitoring program for two agricultural chemicals. This study involved performing statistical analysis of U.S.G.S. stream discharge data from about 120 candidate counties, selecting the subgroup to be sampled, identifying stream sites, designing a detailed sampling protocol, collecting samples over a 2-year period at 25 sites from Florida to Colorado, and coordinating the program with the contract analytical laboratory. The purpose of this project was to assess the effect of several variables (e.g. seasonal changes, river size, topography) upon the levels of agricultural chemicals in the water.

Expert Testimony in California:

ROUX ASSOCIATES provided expert testimony at regulatory agency hearings in California regarding herbicides detected in ground water. The hearings were held pursuant to Section 13149 of the Food and Agricultural Code regulating economic poisons in ground water.

Nationwide Ground-Water Monitoring Program:

ROUX ASSOCIATES designed and implemented a nationwide ground-water monitoring program for three agricultural chemicals. A list of counties vulnerable to pesticide leaching was determined and a statistically similar subgroup was selected to monitor existing domestic supply wells. Individual wells were selected, inspected for proper siting and construction, and sampled according to a detailed protocol on a quarterly schedule. Samples were shipped to a contract laboratory, and analytical results were evaluated.

Methodology Development:

ROUX ASSOCIATES developed a methodology to locate specific soil types and hydrogeologic conditions that are most likely to allow agricultural chemicals to enter ground water. A ranking method which evaluates 20 factors was developed and applied. Sensitive area maps for thirteen states were prepared on a county-wide scale and combined into detailed state scale maps.

Flow and Transport Modeling:

ROUX ASSOCIATES applied unsaturated (PRZM) and saturated (RANDOM WALK and MOC) flow and solute transport models to predict the movement of selected herbicides from the point of application to a point of potential use in the shallow aquifer beyond the edge of the field.

Large-Scale Retrospective Program:

ROUX ASSOCIATES designed and implemented a large-scale retrospective monitoring program of 240 wells in four states. The program was negotiated on behalf of the client with USEPA. The counties and wells sampled were selected according to product usage and hydrogeologic sensitivity. Detailed information on well construction, product usage, and possible point sources were collected. Permission to sample was followed with sample collection and shipment. The results of the program were evaluated and general conclusions were provided regarding pathways of the herbicide to ground water. A final report was prepared and submitted.

Small-Scale Prospective Program:

ROUX ASSOCIATES selected a location, based upon site specific geology, for a small-scale prospective study for a new product. Multi-depth well clusters, lysimeters, and a weather station were installed. Soil samples, soil water samples, and ground-water samples were collected on a pre-defined schedule.

Expert Testimony, Science Advisory Panel:

ROUX ASSOCIATES provided expert testimony to EPA's Science Advisory Panel (SAP) regarding the reported occurrences of an agricultural chemical product in ground water. The hearing was requested by the registrant in response to a registration cancellation notice from EPA. The registration was not canceled.

Herbicide Literature Review:

ROUX ASSOCIATES obtained and reviewed published and unpublished information relating to the discovery of a particular herbicide in ground water. The quality and reliability of data was evaluated for 20 high-use states. Most studies in the literature were found to be inadequate in terms of scientific reliability. In a detailed report, the information was evaluated and the most likely pathways were presented by which the herbicide reached the various wells.

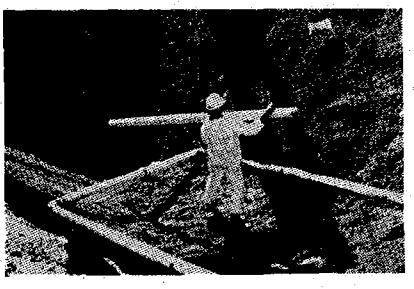
Investigation of Herbicide Pathway to Ground Water:

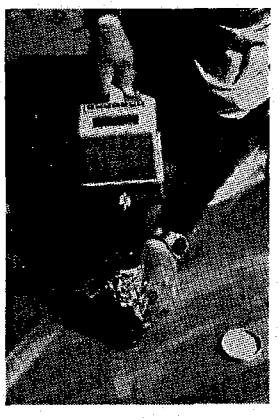
ROUX ASSOCIATES sampled 240 wells to determine whether a particular herbicide leaches to ground water under certain soil and geologic conditions when used at the label-specified application rate. Each selected well was within a herbicide use area and was located within 1,000 ft. of an active farm field. Water samples were collected quarterly and analyzed under GLP. A mass spectrometer was used to confirm each detection. Study results are proprietary.

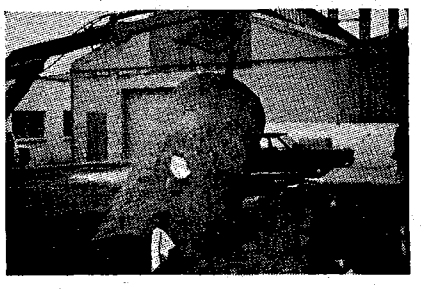
UNDERGROUND STORAGE TANK MANAGEMENT PROGRAMS

ROUX ASSOCIATES conducts UST Management projects for Fortune 500 companies, as well as for smaller industrial firms, municipalities, and commercial property owners. Most of our UST Management Projects are conducted for the major oil companies. We also service major manufacturing companies, smaller commercial properties and municipal facilities. The range of UST Management Services we provide to our clients includes:

- Implementation of All Investigative Activities
- Negotiation with Regulatory Agencies and Adjacent Property Owners
- Development of Work Plans
- Design and Implementation of Remedial Programs
- Supervision of Subcontractors (tank testers, tank pullers, analytical labs)
- Litigation Support/Expert Testimony
- Writing Reports for Submission to State and Federal Agencies







I.
UST SERVICES AT RETAIL GASOLINE SERVICE STATIONS

ROUX ASSOCIATES has performed inspections, subsurface investigations and remediation at hundreds of gasoline service stations, and we are in the midst of investigating scores of retail gasoline service stations for four major oil companies and several independents. We provide our petroleum retailing clients with comprehensive environmental services, from preliminary investigations to closure. Our responsiveness to the environmental needs of the oil industry has resulted in increased involvement with the majors. In addition to providing investigative, subcontractor management, and remediation services, ROUX ASSOCIATES negotiates with regulatory agencies and provides litigation support services to our oil company clients. We also have had special arrangements with two major oil companies, where senior ROUX professionals are retained to oversee or manage projects at the client's corporate facilities. The following describes some UST highlights with the oil industry:

45 Gasoline Stations for the East Coast Divestiture Action Plan of a Major Petroleum Company:

ROUX ASSOCIATES managed and directed soil and ground-water investigation and remediation programs at 45 retail gasoline stations located in 8 New England and Mid-Atlantic states (NJ, NY, DE, MD, CT, MA, PA, and RI). The company developed work plans, negotiated with regulatory agencies, and implemented investigation and remedial programs. Investigations included installing and sampling soil borings, monitoring wells, soil gas surveys, slug tests, and pump tests. Remedial activities included ground-water monitoring, removal of USTs, demolition of existing facilities, well gauging and bailing for product removal, pump and treat using air stripping and activated carbon systems, venting, and soil excavation / disposal.

UST Removal and Soil Sampling Program at 12 California sites for Oil Company:

ROUX ASSOCIATES managed the excavation and removal of underground storage tanks at 12 gasoline service station sites in California. ROUX ASSOCIATES collected soil samples from the excavation pits and directed the removal of impacted soils. At several sites, backfilling the tank cavities with PHC-impacted soil for future in-situ treatment was negotiated with local regulatory agencies.

12 Subsurface Evaluations in New York for Different Major Oil Company:

ROUX ASSOCIATES has performed subsurface evaluations on 12 sites in New York City and Long Island to support a major oil company's activities in site acquisitions, site divestitures, tank removals, monitoring programs, and spill management. Projects included geophysical surveying, well installation and monitoring, soil sampling, vapor surveys, and remediation system design.

Environmental Support for Property Transfer of 21 Retail Gasoline Stations for Independent:

ROUX ASSOCIATES provided a retail gasoline chain with environmental support regarding the impending sale of twenty one retail gasoline stations in New Jersey and Pennsylvania. Soil and ground-water contamination was detected by others at several sites. The client was assisted with the implementation of a tank removal program and with the development/execution of appropriate investigation and remediation programs. Remediation programs include in-situ soil venting, product recovery, and pump and treatment systems.

Litigation Support Regarding Client's Former Service Station Site:

ROUX ASSOCIATES evaluated site history, environmental setting, and tank testing records prior to the preparation of a draft report indicating that the integrity of the client's underground storage tanks was acceptable at the time the client sold the service station. Any impacts of ground-water levels on the integrity of tank testing data were evaluated. The information presented has assisted the client in avoiding

site cleanup responsibilities with the current owner and the state's environmental agency. The case is in active litigation.

Remediation Design and Implementation:

ROUX ASSOCIATES is addressing a state-issued pollution abatement order on behalf of our client to recover free phase and dissolved product from a gasoline service station site and surrounding properties. Work had been initiated by another consultant. ROUX ASSOCIATES installed single- and multi-level wells, modified an on-site air stripping/carbon adsorption treatment system, installed a soil venting system, and supervised building demolition and UST (5 tanks) removal activities. Technical discussions were presented at a public hearing in order to obtain wetland permits for the permanent discharge of treated water. A 1,000-foot water discharge line was connected to the public sewer system. The system is currently treating ground water and collecting free product.

Cost Analysis and Forecast of Laboratory Work Contracted Directly by Client:

ROUX ASSOCIATES is in the process of conducting an analysis of laboratory costs associated with the divestiture program of a major oil company's operations in the Mid-Atlantic and New England States. The project entails data collection, data reduction, and data analysis, and is being conducted by ROUX ASSOCIATES operations managers and chemists. Items to be analyzed include billings by laboratory facility, by month, by analytical procedure, by state analytical requirements, and a review of QA/QC issues. The study is expected to provide insight regarding the benefit of a national contract with a select group of laboratories.

A one-year Contract with Major Oil Company to Provide Technical Review of Other Consultants' Work: ROUX ASSOCIATES was retained by a major oil company to provide technical review services of UST work performed by other consultants in northern California. A ROUX ASSOCIATES' senior hydrogeologist was retained full-time for one year at the oil company's regional office. After the contract expired in 1990, the program was continued on a time and expense basis. Responsibilities of

the senior hydrogeologist included reviewing draft documents submitted by other consultants; discussing the findings, conclusions, and proposed work with the oil company's regional engineer; and contacting the contracted consultants to discuss potential changes in the draft documents. The ROUX hydrogeologist was also responsible for managing site investigation, tank removal, and remediation projects contracted to ROUX ASSOCIATES in northern California. Miscellaneous tasks included providing oversight of the project consultant, arranging for the hauling and disposal of PHC-impacted soil and purge water, and attending regulatory meetings on behalf of the oil company.

Management of Dry Well Closure Program in New York for Major Oil Company:

ROUX ASSOCIATES is currently managing all aspects of a drywell closure program of all service station sites in the New York City Metropolitan Area for a major oil company. Dry wells which receive effluent from service bay drains have recently been classified as Class II injection wells. Work completed by ROUX ASSOCIATES to date includes preparation of work plans; development of a bay drains discharge confidence ranking system; telephone surveys to identify stations with bay drains; station manager interviews for background information about leach fields, drywell systems, oil/water separators, storm and sanitary sewer lines; inspection of all service stations in New York City and Long Island to identify discharge points, cutouts, buried objects; coordination with USEPA and local environmental agencies; and supervision of drywell closures. The closure program includes negotiating cleanup plans with appropriate agencies; excavating drywells and surrounding soil; taking soil borings if migration is indicated; conducting post-excavation sampling; and analyzing samples for TPH, metals, BTX, and halogenated hydrocarbons.

Soil Gas Survey / Pilot Venting Program:

ROUX ASSOCIATES conducted a soil gas survey at a Delaware gasoline service station to determine the extent of TPH in soil and the applicability of remediation by soil venting. Vapor probe / vacuum head measurement points were installed throughout

the unsaturated zone to measure hydrocarbon levels. A vacuum pump was connected to a monitoring well to determine the vapor recovery rate. The vacuum head at each probe and well was measured to determine the area of influence. The composite data were then used to evaluate various design factors, such as the size of vacuum pump required, the optimum operating procedure, the duration of the remediation stage, and whether an air treatment system was necessary. A proposed remedial program has been submitted to the state for approval.

Assessment of Bioremediation and Pump & Treatment Effectiveness at Gasoline Service Station:

ROUX ASSOCIATES replaced another contractor to assess bioremediation and ground-water pump and treatment effectiveness in till and bedrock aquifers at a New Jersey service station site. ROUX ASSOCIATES will prepare a report for the client detailing current status and remediation options, and will then meet with the State of Pennsylvania on the client's behalf to discuss implementation of the remediation program.

Expert Testimony:

ROUX ASSOCIATES successfully demonstrated the improbability of our client's involvement in petroleum product contamination of a cluster of residential supply wells. Site hydrology and contaminant distribution profile were evaluated, a report was prepared, and a deposition was conducted. Our client's involvement was settled out of court following the deposition.

Litigation Support Regarding Liabilities Associated with the Sale of a Former Gasoline Service Station and Truck Fueling Facility:

ROUX ASSOCIATES prepared an expert report on behalf of a major oil company describing site histories and characterizing current soil and ground-water quality conditions at a former gasoline service station and truck fueling facility in New Jersey. ROUX ASSOCIATES deposition, to be taken in late 1991, will demonstrate that the release occurred after the sale of the property. The evaluation will be based upon data collected by others, and no independent site work will be conducted.

Service Station Investigation Extended Off-Site:

ROUX ASSOCIATES completed all phases of a leaking underground fuel line investigation at a California service station. The investigation extended to adjacent properties. The installation of seven off-site monitoring wells and six on-site monitoring and recovery wells was negotiated and arranged. Free product was detected on-site. Hydrocarbon contamination was also detected off-site from an upgradient source. The site investigation defined and separated the extent of contamination from our client's property and from the upgradient source. A remediation program, which will include free product recovery, vapor extraction, and ground-water surface treatment, will begin after regulatory approval and permitting.

UST Rupture and Subsequent Recovery/Investigation/Remedial Performance Test:

ROUX ASSOCIATES was retained by a major oil company to respond to a 5,000-gallon release at a ruptured underground storage tank at a site in northern California. ROUX ASSOCIATES installed recovery and monitoring wells, which resulted in the recovery of 2,300 gallons of free product and the delineation of the extent of impacted ground water. After the USTs at the site were replaced, ROUX ASSOCIATES conducted a soil venting/vacuum extraction pilot test which indicated that in-situ vacuum extraction technology is appropriate for remediating the soils at the site. A soil venting system will be designed and implemented. The radius of influence was determined to be in excess of 50 feet, which will allow for a minimum number of extraction points.

Service Station Clean-up:

ROUX ASSOCIATES drilled soil borings and installed monitoring wells to evaluate the presence of total petroleum hydrocarbons (TPHs) from leaking underground fuel and waste oil tanks. A limited clean-up was performed after the tanks were removed. Excavated soil was aerated on-site to acceptable hydrocarbon concentrations, and then backfilled. Further investigation was recommended and is pending client approval.

Vapor Extraction System:

ROUX ASSOCIATES successfully negotiated with the NJDEP for a short-term vapor extraction program to replace a long-term ground-water pump and treatment program at a former gasoline service station in New Jersey. ROUX ASSOCIATES conducted a soil gas survey and pilot soil venting program to evaluate the feasibility of the soil vapor extraction system. The pilot studies indicated that the system was feasible, and that a combination of horizontal and vertical in-situ soil venting was appropriate. A full-scale system was installed, and has been extracting volatile organic vapors from an 80-foot horizontal area (from the extraction point) since early 1991.

Within four months, vapor extractions have decreased by four fold. The system will be re-evaluated after six months of continuous operation. In addition, ground-water quality beneath the site will be evaluated by determining whether the vapor extraction system can reduce VOC concentrations from the upper aquifer. ROUX ASSOCIATES has been collecting quarterly samples from eight on-site monitoring wells to aid in this assessment.

Pre-Closure Requirements at a Gasoline Service Station:

ROUX ASSOCIATES installed and operated a free product recovery system and ground-water treatment system, and then removed a 550 gallon heating oil tank and a waste oil tank as part of pre-closure requirements of a site being divested by the client. After a follow-up sampling round is completed, monthly water level measurements will be conducted.

Service Station Investigation:

ROUX ASSOCIATES completed a site investigation for leaking underground fuel tanks at a West Coast service station. Monitoring wells were installed. Site remediation was not necessary.

Leaking UST in San Francisco:

ROUX ASSOCIATES completed a site investigation of a leaking underground storage tank in San Francisco. Monitoring wells indicated a hydraulic gradient of more than 10 feet across the site. Minor fuel impacts were detected in the soils and ground water. A monitoring program has been implemented.

Soils and Ground-Water Assessment at Client's Former Service Station Site:

ROUX ASSOCIATES is conducting a soils and ground-water assessment at a service station site formerly owned and operated by our client. The lateral and vertical extent of PHC impacts are being evaluated via borehole (on-site, off-site) and ground-water analysis.

II.
UST SERVICES AT INDUSTRIAL FACILITIES

ROUX ASSOCIATES has conducted UST Management Programs for Fortune 500 and smaller industrial companies in the chemical, pharmaceutical, and manufacturing industries. We have investigated leaking USTs at abandoned sites, conducted detailed exploratory programs, prepared health & safety risk assessments, designed remediation systems, and assisted our clients in moving towards site closure. The following describes some UST highlights with our Fortune 500 industrial clients at their sites and fueling stations:

UST Removal and Closure:

ROUX ASSOCIATES provided consulting services for the removal and closure of underground storage tanks in Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Ohio, Illinois, Indiana, Wisconsin, Michigan, Arkansas, California and Arizona. Most of these sites are owned by chemical and manufacturing companies.

UST Management Services at 20 sites for Water Supply Company:

ROUX ASSOCIATES is providing a water supply company with comprehensive underground storage tank management services at over 20 sites in New Jersey. The services include preparation of tank removal plans, oversight of tank decommissioning activities, soils and ground-water investigations, and preparation of reports to the client and NJDEP. Many of the facilities contain public water supply wells, and are therefore environmentally sensitive. ROUX ASSOCIATES is working with the client to assure compliance with all state regulatory requirements.

Fueling Stations at Abandoned Siding Plant:

ROUX ASSOCIATES investigated leaking USTs at an abandoned industrial fueling station. The tanks were removed and six soil borings were drilled to define the extent of total petroleum hydrocarbons (TPHs) in the soil. Ground water was at 185 feet. An inverted cone of TPHs in soils extended to 65 feet. Ground water was not at risk, and remediation was not recommended. Closure is pending regulatory approval.

Pre-Divestiture Discovery of UST Releases, PCB in Soils, and Impacted Ground Water:

ROUX ASSOCIATES conducted a preliminary investigation at a vacant manufacturing facility in Wisconsin, prior to divestiture. Data from four monitoring wells and ten soil borings indicated the existence of releases from on-site tanks, PCB-containing oils in pits at several locations, and impacted ground water entering the property from an off-site source. Twelve underground storage tanks were removed, and post-excavation sampling indicated that all twelve tanks experienced releases. A UST release investigation was approved by the State, and implemented. Preliminary remedial actions consist of soil excavation and recycling through an asphalt plant, excavation and disposal of other soils (which were more suited to disposal), ground-water extraction, asbestos abatement, and PCB decontamination.

Diesel Migration Down to 160 Feet:

At an industrial fueling station, ROUX ASSOCIATES completed a site investigation for a leaking underground diesel tank. Oil extended to 160 ft. below land surface at concentrations up to 14,000 ppm TPH. Seven soil borings were drilled (up to 295 feet) and sampled in boulder-containing alluvial soils to define the horizontal and vertical extent of the TPH movement. The site investigation defined a narrow zone through which the diesel fuel migrated downward in unsaturated soils. Remediation included capping the site with bentonite and asphalt. Closure was authorized by the state's water quality control board.

State Approves 'Monitor Only' Strategy:

ROUX ASSOCIATES was retained by a chemical manufacturing and distribution facility to assess and characterize ground-water and soil impacts from a site which experienced a release from an underground fuel oil storage tank. The client had removed the tank, excavated impacted soils, and installed one monitoring well in the tank field backfill. Initial investigative efforts by others indicated the presence of ground-water contamination. ROUX ASSOCIATES resampled the well and conducted a regional hydrogeological assessment to identify possible receptors. Due to low residual fuel oil concentrations, a 50-foot bed of underlying clays and silts, and a creek immediately downgradient of the site, receptors were not impacted. Based upon these results, a 'monitor only' strategy with subsequent full closure was proposed and has been tentatively approved by the state environmental agency.

Moving Towards Closure at a Site Investigated by Others:

ROUX ASSOCIATES was retained to conduct confirmation sampling of previously installed wells at a New Jersey medical diagnostics manufacturing facility. Prior history of the site included the leaking and replacement of a 20,000 gallon fuel oil storage tank, removal of impacted soil, the installation of four monitoring wells, and the detection of free product at one well. ROUX ASSOCIATES secured closure approvals from the NJDEP, and is presently petitioning the agency to allow the wells to be used as leak detection monitoring points to satisfy federal UST regulations.

Abandoned UST's Identified at an Industrial Site:

ROUX ASSOCIATES conducted test pitting and magnetometer surveys which identified three abandoned USTs, two buried drum and container areas, and isolated pockets of coal tars released to the subsurface at a former paint and refractory plant. Remediation efforts to date have been focused on overseeing the removal of tanks, drums, and containers. The source removal phase was completed in January 1991. A work plan is being prepared to evaluate potential residual contamination and impact on ground-water quality.

Abandoned UST Removal at Manufacturing Facility:

ROUX ASSOCIATES removed an abandoned gasoline UST at a New Jersey industrial manufacturing facility. Samples from the base of the excavation indicated possible residual levels of TPH. The NJDEP requested an additional investigation. ROUX ASSOCIATES installed a contingency venting system in the tank field backfill, plus a series of piezometers to assess ground-water quality and flow patterns. Subsequent sampling indicated that migration had not occurred. Full closure was proposed to the state. The site is currently in the phantom closure phase (i.e., low priority, no activity).

Investigation for UST Closure At Manufacturing Plant:

ROUX ASSOCIATES conducted an investigation to determine the most efficient method for closure of underground oil tanks at a California manufacturing plant. The tanks were located beneath heavy machinery inside the plant. The drilling program inside the plant included slant borings beneath the tanks. Oil was detected only from surface sources. Closure in-place has been recommended.

Industrial Solvents and Waste Oil Investigation:

ROUX ASSOCIATES completed a site investigation for leaking solvent and waste oil from UST's at an industrial facility. Shallow ground-water conditions and low-permeability sediments restricted the movement of solvents and oil to utility trenches. A monitoring plan was developed to demonstrate this over time.

Risk Assessment for a Water Supply Company:

The potential risks associated with several release scenarios were evaluated to determine the current liability associated with storage of caustic soda (sodium hydroxide) in USTs. Modeling conducted by ROUX ASSOCIATES demonstrated the need to phase-out the single walled USTs.

Pharmaceutical Distribution Facility:

After removal of a fuel oil UST, soil sampling by ROUX ASSOCIATES indicated low levels of residual TPHs. A regional hydrogeological assessment indicated no significant receptors or adverse effects. Full site closure has been proposed and is presently being negotiated with the state.

Small-Scale Investigation of UST Spill:

ROUX ASSOCIATES performed a DICAR (Discharge Investigation and Corrective Action Report) for a major railroad to delineate soil and ground-water quality conditions near a UST fuel spill. The four tanks had been removed. The investigation consisted of the collection of soil samples and installation of seven monitoring wells. ROUX ASSOCIATES found that leakage impacted ground-water quality downgradient of the USTs. Additional wells were recommended to delineate the downgradient extent of the plume. Ground water is being monitored quarterly.

Detailed Exploratory Program:

ROUX ASSOCIATES conducted a detailed exploratory program involving test pit excavation and soil borings to determine the extent of fuel oil in soil and ground water at a storage facility. A remedial plan, which involved the removal of free product from the water table, was developed and implemented.

UST Registration:

ROUX ASSOCIATES obtained the necessary information and completed all forms required to properly register underground storage tanks for a major petroleum products distribution terminal.

Work Plan Prepared for a Water Supply Company:

After other firms removed a leaking UST, installed monitoring wells, and detected contamination in ground water, ROUX ASSOCIATES was selected to prepare a work plan to delineate the extent of product migration. The work plan, including further

ground water investigation and assessment of possible upgradient sources, is awaiting approval from the NJDEP.

Hydrocarbon "Vulnerability" Analysis:

ROUX ASSOCIATES obtained and analyzed demographic, regulatory, geologic and ground-water data from selected areas of the country. The purpose of this analysis was to identify and map areas which are most vulnerable to hydrocarbon leaks and spills (i.e., gasoline, fuel oil) and are therefore most likely to require remediation.

Hydrocarbon Migration Study:

ROUX ASSOCIATES conducted an initial investigation to determine the horizontal and vertical extent of a hydrocarbon leak from an underground tank at a research facility in Connecticut. Hand auger cores and test pits were examined between the suspected tank location and a nearby wetlands, and a preliminary map of the extent of the leak was produced.

Gasoline Plume Migration:

ROUX ASSOCIATES determined the extent of a gasoline plume due to a leaking underground tank at a county facility in upstate New York. Soil cores were logged and analyzed in the field with a portable hydrocarbon detector to map the lateral extent and depth of the contamination.

III.
UST SERVICES AT MUNICIPAL FACILITIES & COMMERCIAL PROPERTIES

ROUX ASSOCIATES conducts UST Management Programs at commercial real estate properties and at municipal buildings. The following are representative projects we have conducted at condominiums, hotels, schools, and other municipal buildings:

Emergency Investigation at Condominium Complex:

ROUX ASSOCIATES performed an emergency investigation to delineate and remediate a fuel oil spill from an underground tank at a condominium complex on Long Island. The project included installation of monitoring wells to delineate the free product plume, and the design/installation/operation of a free product and ground water recovery and treatment system.

UST Investigation at Resort Hotel:

ROUX ASSOCIATES investigated soils and ground water impacted by diesel fuel in a UST vault at a popular resort hotel. ROUX ASSOCIATES determined that the vault was not fully encapsulated, and that free product had migrated out of the vault area. The extent of the migration was evaluated, and a remediation work plan was developed for the client.

Management of a Leaking UST at a Middle School:

ROUX ASSOCIATES was retained by the Board of Education after a release from an underground fuel oil storage tank prompted emergency response and a subsequent investigation. Ground water and surface water were impacted as a result of pumping from a basement sump system to a storm sewer discharge. ROUX ASSOCIATES managed the tank removal, investigated the cause of the initial release, installed a recovery well in the tank field backfill, installed five monitoring wells, and traced the

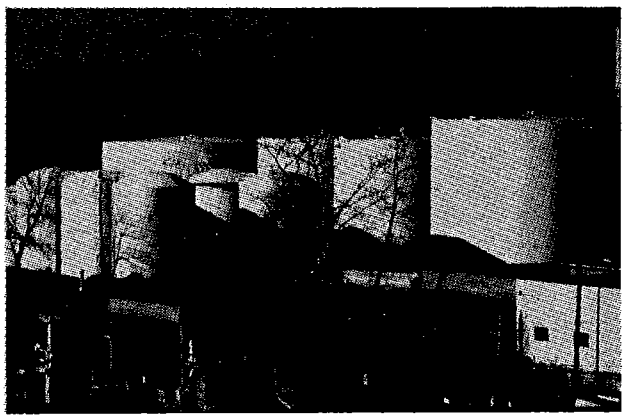
storm and sanitary sewer lines. ROUX ASSOCIATES also designed and supervised the installation of a carbon treatment system for ground water entering a basement sump, secured approvals for discharging treated water to the local POTW, and conducted a regional assessment to identify potential receptors. Following removal of the source, residual fuel oil impacts were naturally attenuated, and closure was proposed to the state environmental agency. ROUX ASSOCIATES retained an outside metallurgist to evaluate the integrity and possible failure of the tank.

Investigation of Source of Water in Underground Storage Tank

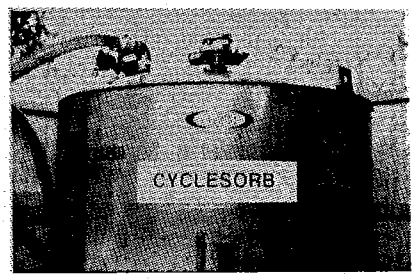
ROUX ASSOCIATES was retained by a New Jersey township to determine whether an underground diesel storage tank at a fire station site was leaking. Water was discovered in the tank, and testing by others proved inconclusive. The NJDEP was notified that the tank might be leaking, and subsequently requested implementation of a soils and ground-water investigation study. ROUX ASSOCIATES found that the tank and lines were tight, and that the water was due to condensation or fuel quality problems. Based upon these results, the diesel tank was returned to service and 'No Further Action' (NFA) was approved by the state.

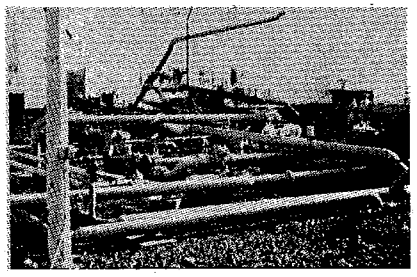
INDUSTRIAL FACILITIES

ROUX ASSOCIATES assists Fortune 500 firms in the chemical, petroleum, and manufacturing industries with environmental management programs at industrial facilities across the country. ROUX ASSOCIATES conducts remedial investigation and feasibility programs in response to environmental compliance regulations, and we conduct site assessments for property transactions. The services we provide at industrial facilities of our clients include:



- Complete Project Management
- Subsurface Investigations
- Health and Environmental Risk Assessments
- Regulatory Negotiations
- Remediation Design and Construction Management
- Litigation Support / Expert Testimony
- Health and Safety Audits





A representative sampling of our experience with manufacturing facilities, bulk storage terminals, and property transfer assessments is presented in this section.

I.
MANUFACTURING FACILITIES

ROUX ASSOCIATES conducts preliminary site assessments, remedial investigations, and cleanup projects for over thirty Fortune 500 manufacturing companies. ROUX ASSOCIATES evaluates site histories, prepares work plans, conducts plant-wide hydrogeological assessments and complex RI/FSs, and assists clients with a host of related environmental services (e.g. environmental compliance audits, waste minimization studies, SARA Title III compliance studies, health and environmental risk assessments, discharge to ground-water permits, air permits, etc). Representative projects conducted at industrial facilities are described below:

RI/FS at Industrial Manufacturing Facility Adjacent to 'Sensitive' Wetlands Area:

ROUX ASSOCIATES is presently conducting a full-scale RI/FS for a facility which manufactures electrical harness wiring for the aerospace industry. Volatile organic compounds were detected in nearby potable supply wells. Multiple source areas and the extent of contamination were determined by others. ROUX ASSOCIATES was retained after NJDEP executed an Administrative Consent Order. Implementation of a pre-approved work plan for the RI has been completed. Tasks conducted include the installation of additional monitoring wells, head space and laboratory analysis of soils, sampling of surface and ground waters, packer testing of select rock wells, pumping/aquifer testing, air monitoring, and the delineation of potentially impacted wetlands areas. ROUX ASSOCIATES is currently developing remedial alternatives for the FS. Possible FS alternatives include a dual aquifer pump and treatment system and vapor extraction for impacted areas.

ROUX ASSOCIATES conducted a human exposure risk assessment after the RI revealed chlorinated solvents in soils, shallow ground water, and the underlying fractured bedrock aquifer. Human exposure scenarios considered included children playing on/adjacent to the site, and employees conducting maintenance activities. Use of the underlying aquifer as a source of drinking water was also considered.

Potential exposure of ecological receptors was weighed, but direct exposure pathways did not appear to be relevant. Recommendations for cleanup were based upon the presence of vinyl chloride and associated breakdown products in an aquifer which could potentially be directly used as a source of drinking water.

RI /FS Work Plan:

ROUX ASSOCIATES is currently performing an RI/FS to investigate soil and ground-water conditions at a large New York City rail yard. The RI/FS includes sampling soil borings, installing and sampling monitoring wells, implementing interim remedial action measures to recover PCB-contaminated separate-phase oil which underlies a portion of the yard, performance of a health-based risk assessment, and evaluation of remedial alternatives.

Technical Assistance and Review of Other Consultant's Work:

ROUX ASSOCIATES was retained by a Fortune 500 manufacturing firm to evaluate allegations that it had contributed to a ground-water contamination problem when it had occupied an Illinois site several years ago. ROUX ASSOCIATES reviewed regulatory agency files, manifests, technical reports, aerial photographs, and newspaper articles, and interviewed people familiar with the history of the site. Based upon aerial photographs and the nature of the detected analytes, it was concluded that a surface lagoon was the primary source of the release, and that the lagoon had been constructed after the client sold the facility. Furthermore, the contamination resembled products handled by the current owner, and not those products handled by our client. ROUX ASSOCIATES worked closely with our client's counsel to respond to the technical issues pertaining to the allegations.

Environmental Compliance Audit at 3 Agricultural Research Centers:

ROUX ASSOCIATES conducted an internal environmental compliance audit program at three agricultural research centers for a major manufacturer of pesticide chemicals. The audits, which will be conducted annually, were conducted at sites in Mississippi, Iowa, and California, and involved ROUX staff from our California, Illinois, and New Jersey offices.

Assessment, Excavation, and Bioremediation of Soils at a Quarry Site:

ROUX ASSOCIATES conducted surface soil sampling and 40-foot soil boring programs to define the extent of diesel and gear oil releases at a California mining quarry site. Soils were subsequently excavated from two areas–the extent of which was determined by confirmation sampling of unimpacted soils. Nine hundred cubic yards of soils were backfilled with regulatory approval, and the site will be treated with bioremediation.

Point Counting Microscopy of Asbestos-Bearing Mining Wastes Drastically Reduces Remediation Requirements:

ROUX ASSOCIATES collected surface samples of mining wastes for analysis by polarized light microscopy. An original estimate of 10,000 cubic yards of wastes were recommended for remediation using this technique. However, after a more detailed review, it became apparent that the mineral wollastonite had been frequently misidentified as asbestiform tremolite. After mineralogical corrections were made utilizing point counting polarized light microscopic techniques, the volume of wastes requiring remediation was reduced from 10,000 cubic yards to less than 40 cubic yards.

Investigation and Design of Recovery System for NAPLs, DNAPLs, and PHCs, at a Roofing Materials Manufacturing Facility:

ROUX ASSOCIATES is currently conducting a subsurface investigation to evaluate the

extent of NAPL, DNAPL, and dissolved hydrocarbons in connection with ground-water remediation at a roofing materials manufacturing facility. ROUX ASSOCIATES conducted a soil boring investigation and installed monitoring wells to determine the nature and extent of hydrocarbons in soil and ground water which resulted from land disposal of process wastes. The separate phase hydrocarbon plume consists of highly viscous asphaltic wastes and PCB constituents. A detailed evaluation of the history of the site, including waste disposal practices, is being conducted. ROUX ASSOCIATES is currently designing a free-phase hydrocarbon interceptor system, and the company will manage construction and implementation of the interceptor. Investigations and remedial design are underway to address site-wide remediation.

Inappropriate Analytical Technique Proven to Show False Positives:

ROUX ASSOCIATES evaluated whether EPA Analytical Method 418.1 was appropriate for analyzing hydrocarbon concentrations at a quarry and minerals processing facility in California. The analytical method had detected high concentrations of hydrocarbons, and no apparent source could be found. A re-examination of the soils and re-analysis by Method 418.1 indicated spurious results which could not reflect true hydrocarbon concentrations in the soils. These results were presented to the Regional Water Quality Control Board, which agreed that Method 418.1 could not be used at the site. Other analyses indicated non-detects (ND), and the issue was considered closed by the Board. No remediation was required at the site.

Comprehensive Environmental Assessment at the Formerly Largest Railyard in Texas:

ROUX ASSOCIATES is conducting a comprehensive environmental assessment of an abandoned and demolished railyard which was formerly the largest railyard in Texas. The railyard operated for over 50 years and encompassed over 500 acres. ROUX ASSOCIATES is assessing waste disposal practices and hydrocarbon product storage locations via the review of historic aerial photographs and interviews with former

railroad employees. A site sampling and analytical plan was developed, and ROUX ASSOCIATES will assess the extent of soil and ground-water impacts from fuel and waste releases. Soil borings and monitoring wells were also installed in connection with UST closure efforts at the site.

MODFLOW Ground-Water Modeling at a Defense Electronics Facility:

ROUX ASSOCIATES was retained by a major electronics and computer manufacturer to conduct an on-site and off-site subsurface investigation at a manufacturing facility in New York. As part of this investigation, a 3-dimensional ground-water flow model (MODFLOW) was constructed to determine the number of recovery wells and corresponding pumpage rates which would be required to contain the ground-water plume originating from the site. The model was employed using available data as a first-order approximation of remediation design considerations. Assuming various horizontal and vertical plume dimensions, scenario simulations required to conduct hydraulic barriers were determined.

Environmental Investigation at a Former Pesticide Formulation Facility:

ROUX ASSOCIATES conducted a soil, ground-water, and surface-water quality investigation at a former pesticide formulation plant in Massachusetts. After ten monitoring wells were installed, ROUX ASSOCIATES defined ground-water flow directions and the interaction of ground water with surface water at the site. Source areas and the extent of the pesticide plume were determined.

Chlorinated Organic Solvents at a Dry Cleaning Store:

ROUX ASSOCIATES investigated soils and ground water impacted by PCE, TCE, and other chlorinated solvents. Public agency files were reviewed to assist in the determination of potential sources. Soil borings were drilled and a monitoring well was installed. When results indicated that additional monitoring was warranted, a work plan was developed to further define the extent of solvents in the subsurface.

Aquifer Testing at Electronics Site Impacted by Chlorinated Solvents:

ROUX ASSOCIATES conducted an aquifer test at a New York electronics manufacturing facility which was the source of a ground-water plume of chlorinated solvents. The aquifer test consisted of a step-drawdown test, a constant rate (pumping) test, and a recovery test. The results of the step test were used to determine the pumping rate for the pumping test. The pumping test provided quantitative values for hydraulic coefficients of the aquifer, head-and-flow relationships under static and pumped conditions, and provided information used to construct analytical and numerical models. The models were then used to provide information regarding capture zones and the feasibility of using existing wells to contain off-site migration of chlorinated solvents.

3-Dimensional Ground-Water Flow in a Complex Environment:

ROUX ASSOCIATES is currently investigating the extent of organic chemicals in a complex and interconnected two-aquifer system under a former pesticide plant in central New Jersey. Both aquifers are pumped, but at different locations and at different rates. Interconnection between the two aquifers is intermittent and not very well defined. An extensive drilling program and a variety of pumping tests using continuous water-level recorders was undertaken to determine three-dimensional ground-water flow. Interim reports were submitted in 1982, 1983, and 1985. A ground-water intercept and treatment system was installed and is operating. The project is ongoing.

Site History Evaluation and Comprehensive Soil and Ground-Water Investigation:

ROUX ASSOCIATES managed all aspects of an ECRA compliance program–from initial filings to cleanup plan, approval, and implementation–at a New Jersey plastic products manufacturing facility. A site history evaluation and comprehensive soil and ground-water investigation was conducted. The client later elected to sell the facility, and the investigation was incorporated into an ECRA investigation and cleanup

program. The investigation revealed elevated levels of metals in an isolated area of fill, low-levels of PCB contamination in trap rock surrounding several transformers, and the existence of previously unidentified dry wells and an abandoned underground fuel oil storage tank. The tank was excavated and removed. PCB-bearing transformers were either retrofitted with non-PCB fluids, or replaced. Impacted trap rock was excavated and removed. A soil and ground-water analysis did not detect contamination in dry wells. The metals in the fill have not migrated, nor have they impacted ground water. Full site closure has been proposed.

Assessment at a Chemical Formulating Plant:

ROUX ASSOCIATES conducted site assessments at a NJ facility, as well as at a vacant parcel of land proposed for a new facility. The assessment included an investigation of site histories, borehole sampling, geologic logging, and surface soil sampling. An environmental impact statement for the proposed facility was approved.

Preparation of Air Permits for New State Regulations:

ROUX ASSOCIATES is working with a New Jersey chemical manufacturing facility to develop and submit information and applications necessary to comply with NJDEP's new air permit procedure for batch production plants.

Compliance with SARA Title III:

ROUX ASSOCIATES conducted comprehensive studies to identify all SARA Title III listed chemicals released at established threshold requirements to air, land, and water at several chemical manufacturing facilities. Methodologies were developed for determining non-measured release rates and all information necessary to complete Federal and State reporting forms were prepared.

Technical Support During Administrative Consent Order (ACO) Negotiations:

Soils containing PCBs from a heat transfer fluid were removed from an on-site

landfill, and an investigation to evaluate the extent and impact of residual contamination was conducted by others at this NJ chemical manufacturing facility. ROUX ASSOCIATES was then retained to provide technical support, including select sampling, during the Administrative Consent Order (ACO) negotiations. ROUX ASSOCIATES was recently selected to conduct the required RI/FS and Interim Remedial Measure (IRM) tasks.

Geophysical Surveys:

ROUX ASSOCIATES conducted numerous geophysical surveys for chemical companies, oil companies, and property developers on developed and undeveloped sites in order to locate tanks, drums, utility lines, and other buried objects. Magnetic and electromagnetic field investigation techniques are employed at the surface or in boreholes.

Air and Water Audit in Arkansas:

ROUX ASSOCIATES conducted an audit of air and water emission points at an Arkansas manufacturing facility to determine compliance with applicable regulations. Air emission sources were characterized, and air permits were received. Non-permitted water discharge points were redirected to the facility's sanitary sewer system, which discharges to the local Public Owned Treatment Works (POTW). Tie-in to the sanitary system required design and installation of a new section of sewer piping.

Fire Safety Code Registration:

ROUX ASSOCIATES developed information necessary to complete a fire safety code registration at a petroleum products distribution terminal. Information was submitted to the New Jersey Department of Community Affairs, and to the township fire code official.

Closure at Truck Stop:

ROUX ASSOCIATES submitted a work plan (approved by NJDEP) to install and sample monitoring wells at a truck stop which experienced a surface release of diesel fuel. Surficial soils were excavated and removed by others. A monitoring well sampling program indicated that no ground-water contamination had occurred. Closure was approved.

Waste Minimization Study for NJPDES / SIU Permit:

ROUX ASSOCIATES was retained by a major chemical company to conduct a waste minimization study as part of an NJPDES / SIU permit at a chemical manufacturing facility in New Jersey. All plant processes were evaluated to characterize current waste loadings and to identify areas for possible waste reduction. A report detailing the waste minimization plan was approved by the NJDEP, and then implemented.

Closure of a Former Septic System:

ROUX ASSOCIATES prepared comments on a draft permit, and submitted work plan for NJPDES Discharge-To-Ground Water permit investigation of a septic tank and leach field system. The system received waste water, sanitary and process wastes, and was recently abandoned for discharge to a publicly-owned treatment works plant.

Discharge-to-Ground Water (DGW) Permit for Closure of Settling Ponds:

ROUX ASSOCIATES sampled sediments and surface water in four settling ponds, and installed a monitoring well at a New Jersey manufacturing facility to evaluate possible ground-water impact under provisions of a NJPDES–DGW permit. Closure was approved by NJDEP after analytical results indicated that there was no adverse impact to ground water.

Waste Solvent Investigation Surrounding an Unlined Burn Pit:

ROUX ASSOCIATES conducted a soil gas survey, test pitting and boring program, and

installed piezometers to evaluate the extent of migration of waste solvents burned in an unlined pit during fire safety training exercises. Limited migration was indicated, and releases have been curtailed. Several remedial alternatives are currently under evaluation.

Plant-wide Hydrogeological Assessment:

ROUX ASSOCIATES conducted a plant-wide hydrogeological assessment to determine ground-water patterns and possible locations of future monitoring wells at a chemical manufacturing facility. NJDEP requested the client to file for an NJPDES Discharge-To-Ground Water Permit when the agency became concerned about several areas where potential discharge to ground water could be occurring. ROUX ASSOCIATES installed piezometers and evaluated regional ground-water characteristics. Water level data are being collected on a quarterly basis to evaluate seasonal variations.

Monitoring at a Proposed C&D Landfill:

ROUX ASSOCIATES developed a monitoring program consistent with the January 1989 New York State regulations for solid waste disposal facilities (6NYCRR Part 360, Solid Waste Management Facilities). The site is listed as a Class 2A State Superfund Site, and contains jet fuel from an upgradient tank farm spill. Three landfills are located nearby.

Disposal Site Investigation:

ROUX ASSOCIATES conducted a three-dimensional hydrogeologic investigation at a disposal site located on the presumed recharge area of a sole source aquifer on Long Island. ROUX ASSOCIATES successfully mapped horizontal and vertical ground-water flow components by installing multi-level monitoring well clusters. It was demonstrated to regulatory agencies and concerned parties that the site did not affect ground-water quality. Expert testimony was provided in a legal proceeding regarding this project.

Ground-Water Monitoring at a NYS Utility:

ROUX ASSOCIATES installed and sampled monitoring wells around above-ground storage tanks for an oil storage facility. A soil gas survey was also conducted. The study was conducted to comply with NYSDEC regulations and to support the development of a ground-water contingency plan.

Hydrogeologic Investigation to Support Landfill Permit:

ROUX ASSOCIATES was subcontracted by an engineering firm to conduct a hydrogeologic investigation designed to understand the aquifer system and provide baseline water quality data to obtain a permit to operate a landfill (NYSDEC Part 360 regulations). Multiple-well clusters were installed, specific capacity tests were performed, clay permeabilities were measured, and water quality data were collected.

Suitability of a Site for a Proposed Hazardous Waste Incinerator:

ROUX ASSOCIATES was retained by a New Jersey township to evaluate the suitability of a site for a state- proposed hazardous waste incinerator. The hydrogeology at the site was compared to various siting criteria, including depth to ground water, vertical flow gradient, and the location of nearby water supply wells. The data revealed that the site was in violation of the siting criteria and should be rejected as a candidate site for the incinerator.

Assessment of Water Quality at DOE Facility:

ROUX ASSOCIATES was retained to install monitoring wells at a New York DOE facility to determine ground-water quality and flow conditions. A variety of chemical and radioactive materials were being handled on-site. ROUX ASSOCIATES also provided on-site health & safety monitoring services.

Soil and Ground-Water Investigation at Manufacturing Facility:

ROUX ASSOCIATES was retained by a Long Island, New York, manufacturer which

was under court order and dissatisfied with its existing consultant. Results of the investigation indicated that there was no impact to soils, but that downgradient ground water was impacted. Two monitoring wells and soil samples were installed inside the manufacturing facility to evaluate whether the facility was the source of the contamination.

Assessment at Warehouse Site:

ROUX ASSOCIATES conducted a site assessment and developed a work plan to address petroleum hydrocarbons in soils and ground water at a warehouse property. The investigation was conducted in response to a request by the Central Coast Region of the California Regional Water Quality Control Board.

II.
PETROLEUM BULK STORAGE TERMINALS

ROUX ASSOCIATES has been involved with site assessments, hydrogeological investigations, regulatory negotiations, and corrective action implementations at bulk storage terminals for major oil companies and industrial manufacturers. The investigations are prompted by property transfers or regulatory requirements at the state or federal levels. The following are representative projects which the company has recently conducted at bulk storage petroleum terminals:

Hydrogeologic Investigation at the Nation's Largest Petroleum Release to the Soil and Ground Water:

ROUX ASSOCIATES performed a large-scale ground-water investigation to delineate the extent of a multimillion-gallon subsurface petroleum hydrocarbon plume at a New York bulk storage terminal and former refinery. The project included installing monitoring wells, ground-water sampling, aquifer testing, and ground-water modeling to support the design of a large-scale oil recovery and ground-water treatment system.

Bioremediation of Soils, Free Product Recovery, and Dissolved Phase Recovery of PHCs at a Petroleum Terminal:

ROUX ASSOCIATES developed and implemented ECRA soil and ground-water cleanup plans to remediate free-phase and dissolved-phase petroleum hydrocarbon contamination at a petroleum products terminal of a major oil company. The cleanup plans include excavation and on-site remediation of PHC-contaminated soils, and the possible installation/operation of a 3-pump ground-water recovery and treatment system. A bio-feasibility study is currently being conducted to evaluate alternative treatment technologies.

Thermal Desorption Remediation Technology Implemented at a Petroleum Distribution Terminal:

ROUX ASSOCIATES developed a work plan for NJDEP to conduct a cleanup at a major petroleum distribution terminal. The cleanup plan involves recovery of separate phase product and low-temperature thermal treatment (thermal desorption) of 18,000 cubic yards of impacted soils. Activities conducted by ROUX ASSOCIATES to investigate the site and develop the cleanup plan include the identification of data needs, preparation of a work plan, installation and sampling of monitoring wells, slug testing, product recharge rate evaluations, tidal influence evaluations, installation of a product recovery interceptor trench around the loading rack area (to capture free product on-site), execution of a soil gas survey to further delineate possible soil contamination, development of closure plans for the septic system, development of UST removal plans, pilot testing of thermal stripping technology, and the preparation of design modifications to connect the sanitary discharges to the Public Owned Treatment Works (POTW) and to connect treated stormwater effluent to Newark Bay.

The cleanup plan was approved by NJDEP in December 1989. The remediation project was initiated in January 1990. ROUX ASSOCIATES developed bid specifications, participated in the evaluation of remediation contractors, and provided on-site management for all contractors. Remediation activities performed to date include the removal of four underground storage tanks; excavation, treatment, and backfill of 18,000 cubic yards of impacted soil; removal of asbestos pipe lagging and tank wrapping from the maintenance garage; installation and operation of a 900 foot interceptor trench/product recovery system; and demolition of salt towers. The petroleum terminal has remained fully operational throughout the remedial program.

Sampling & Cleanup Plan at a Petroleum Products Terminal:

ROUX ASSOCIATES developed and implemented a cleanup plan to address ECRA requirements at a decommissioned and demolished petroleum products terminal in New Jersey. The cleanup plan includes excavation and on-site bioremediation of

petroleum hydrocarbon compound (PHC) contaminated soils, the installation / operation of a ground-water recovery trench, and the treatment of recovered ground water. The recovery trench will be backfilled with coarse gravel and several vertical recovery sumps will be used to recover ground water. The vertical recovery sumps, to be used instead of "lateral" collector pipes, will allow easy access for system maintenance.

Management of Contractors and Subcontractors:

ROUX ASSOCIATES has supported a major oil company in the selection of contractors for remediation at several terminal sites. Contractor tasks include asbestos abatement, UST removal, soil excavation, and laboratory work. ROUX ASSOCIATES has also served as on-site project managers of these contractors.

First Air Pollution Control Permit for a Mobile Thermal Desorption System in New Jersey:

ROUX ASSOCIATES succeeded in negotiating the first air pollution control permit for a thermal desorption system in New Jersey, according to the NJDEP. The mobile thermal desorption soil treatment system heats soils to 560 degrees Fahrenheit to remove volatile organic compounds and semivolatiles. The vaporized hydrocarbons are recovered in condensers and scrubbers, particulates are removed in a baghouse, and water moisture is recovered by demisters. A granular activated carbon unit assures 99% VOC removal from the gas stream prior to discharge. A continuous emissions monitor measures VOCs in the exhaust gas and is used to control soil feed rates and carbon change-out. The unit processes 80 cubic yards of soil per day, and will treat a total of 18,000 cubic yards of soil at the site.

Fire Safety Code Registration:

ROUX ASSOCIATES developed information necessary to complete a fire safety code registration at a petroleum products distribution terminal. Information was submitted to the New Jersey Department of Community Affairs, and to the township fire code official.

UST Registration:

ROUX ASSOCIATES obtained the necessary information and completed all forms required to properly register underground storage tanks for a major petroleum products distribution terminal.

III.
PROPERTY TRANSFER ASSESSMENTS

ROUX ASSOCIATES conducts property transfer assessments for owners and potential buyers of commercial or industrial properties. Many of our property transfer assessments are conducted to satisfy state-specific regulations, such as New Jersey ECRA investigations, Connecticut Negative Declaration investigations, Massachusetts Chapter 21E investigations, Illinois Responsible Property Transfer Act investigations, and California Environmental Liability Act investigations. These preliminary assessments are designed to reduce, at reasonable cost, the potential environmental risks and liabilities associated with a property transfer.

All site assessments include:

- Reviews of Property Usage Records
- A Walk-through Inspection
- Data Assessment
- Report Preparation

During the records review, former and current wastes generated, as well as waste management practices at the site, are identified. Searches of violations and listings on environmental databases are conducted. The site is then physically inspected for storage tanks, drum pads, floor drains, drywells, septic systems, and possible waste burial areas. Magnetometers and photoionization meters are routinely employed. Should the assessment indicate the possibility of adverse environmental impact, ROUX ASSOCIATES can conduct a more detailed study to define the extent of the problem and, if necessary, to design or implement an appropriate remediation program.

Phase I and II Property Transfer Investigation for Major Food Manufacturer:

ROUX ASSOCIATES was retained by a major food manufacturing company to conduct an in-depth pre-purchase site investigation on a 40-acre property containing a vacant manufacturing facility in Indiana. The initial phase of the investigation consisted of a site historical review, electromagnetic screening (with an EM-31), soil gas study, radon study of the facility and grounds, asbestos inspection, PCB screening, and monitoring well installation–including soil boring analysis. Areas of potential concern were identified in the vicinity of some underground storage tanks, a drum storage area, and a drain in a solvent storage room. When authorized, an additional investigation consisted of drain tracing with dyes, soil sampling along drain lines beneath the facility, and installing 15 monitoring wells. Remediation cost calculations were presented to the client, along with technical support during negotiations with the seller. The final report was provided within a 10-week period. The disposition of the property is still being negotiated.

Pre-Divestiture Discovery of UST Releases, PCB in Soils, and Impacted Ground Water:

ROUX ASSOCIATES conducted a preliminary investigation at a vacant manufacturing facility in Wisconsin, prior to divestiture. Data from four monitoring wells and ten soil borings indicated the existence of releases from on-site tanks, PCB-containing oils in pits at several locations, and impacted ground water entering the property from an off-site source. Twelve underground storage tanks were removed, and post-excavation sampling indicated that all twelve tanks experienced releases. A UST release investigation was approved by the State, and implemented. Preliminary remedial actions consist of soil excavation and recycling through an asphalt plant, excavation and disposal of other soils (which were more suited to disposal), ground-water extraction, asbestos abatement, and PCB decontamination.

28 Sites in 6 States for Freight Distribution Company:

ROUX ASSOCIATES conducted 28 property transfer assessments at freight distribution terminals in Pennsylvania, Ohio, New York, Michigan, Indiana, and Connecticut. Activities included reviews of site operating histories, evaluation of regulatory agencies files, assessments of local environmental conditions, and visual inspections of all sites and surrounding properties. As required by existing time constraints, all activities were completed in less than 90 days. Results of the project indicated that several sites were impacted by leaking underground storage tanks, two sites were built over inactive landfills, and one site was downgradient and close to a state Superfund site.

Large Industrial Park:

ROUX ASSOCIATES performed an environmental assessment at Buildings 1-10 of a Brooklyn, New York site, once known as "The World's Largest Industrial Park." The 20-acre assessment consisted of a records search, site inspection, and a subsurface investigation (including soil analysis and installation of temporary monitoring wells). In addition, an investigation was conducted to define the extent of remediation that will be required.

Assessment for Home Improvement Chain:

ROUX ASSOCIATES was retained to conduct a Phase 1 and Phase 2 site assessment for a major home improvement chain which was expanding to New England. The investigation led to the discovery of an industrial waste landfilled area which was only 20 feet from a previous consultant's monitoring well (which did not detect any chemical anomalies). ROUX ASSOCIATES also discovered a paint disposal area, plus chlorinated solvents in sediments and stream samples. When the client terminated the purchase contract, the seller countered with a proposed remediation plan. ROUX ASSOCIATES was asked to review the proposal, and to bid on the client's future site assessment projects.

Phase 1 and Phase 2 Property Transfer Assessment in Tennessee:

ROUX ASSOCIATES conducted a Phase 1 & Phase 2 site assessment to determine the presence and distribution of contaminants at a former agricultural chemical manufacturing facility. Phase 1 consisted of a terrain conductivity survey, collection of water samples (from sumps, discharge pipes, test pits), excavation of test pits, collection of soil samples from areas which indicated subsurface anomalies, and collection of soil samples from borings within buildings. Samples were analyzed for metals, inorganics, volatile organics, pesticides, PCBs, base/neutrals, and acid extractables. The Phase 1 report summarized field activities, identified areas of concern, and presented recommendations. Phase 2 consisted of the installation of seven shallow monitoring wells in the unconsolidated zone, plus three bedrock monitoring wells to depths of 150 feet. Ground-water samples were analyzed for pesticides, VOCs and metals. A significant bedrock aquifer was not encountered and contaminant migration via this route was determined unlikely. To assist in negotiations for purchasing the property, preliminary soil remediation costs were provided to the client.

Pre-Divestiture Investigation of Chemical Facility with High TPH Soils:

ROUX ASSOCIATES conducted a subsurface investigation for a major chemical manufacturing company which wanted to sell a New Jersey site to a paper manufacturer. After an initial investigation revealed TPHs in soils, ROUX ASSOCIATES was retained to address UST testing, tank well field sampling, ground-water flow evaluation, and downgradient receptor evaluation. ROUX ASSOCIATES discovered that a 60 foot clay zone provided a barrier to the potable aquifer (The Raritan Aquifer), and that a nearby river acted as a hydraulic barrier for any horizontal discharge. ROUX ASSOCIATES is currently negotiating closure at the site.

Environmental Impact Statement of Proposed Development Project:

ROUX ASSOCIATES developed the hydrogeologic portions of an environmental impact statement for a proposed development project, which included a high-tech industrial park, a retirement facility, and a high density residential community. The site became the focus of media attention after a subsequent release of 1 million gallons of leaded gasoline migrated onto the site from an adjacent tank farm. ROUX ASSOCIATES is involved as oversight managers of remediation activities, and as potential expert witnesses in any litigation which might develop between our client and the owner of the adjacent tank farm.

Risk Assessment of Lead in Soils at Site Proposed for Development:

ROUX ASSOCIATES was retained by a major pharmaceutical company which was interested in divesting a chemical waste storage site. When lead was identified in soil samples of several solid waste management units (SWMUs), a risk assessment was conducted to identify potential exposure pathways for construction workers during preparation of the land for development. The purchaser of the property also retained ROUX ASSOCIATES to evaluate off-site risks, if any, to local residents or workers.

Building Decontamination:

ROUX ASSOCIATES performed a site assessment of a NYC industrial building, as well as surrounding soils and ground water. The assessment defined contaminated residues, contaminated concrete, and standing waters within the plant. Single- and multiple-depth monitoring wells were installed to sample soils and ground water. The hydrogeology at the site is complex due to heavy water supply pumpage, and gradients constantly change with time. The suite of contaminants found inside the building (mainly in the receiving area, outdoor drum storage area, and discharge pipes) matched those in the soil and ground water. Sources of contamination were removed, and a decision for further remedial action is pending.

Human Exposure Scenarios Associated with Chlorinated Solvents at a Closure Investigation:

ROUX ASSOCIATES conducted a human exposure risk assessment after an ECRA closure investigation revealed chlorinated solvents in soils, shallow ground water, and the underlying fractured bedrock aquifer. Human exposure scenarios considered included children playing on/adjacent to the site and employees conducting maintenance activities. Use of the underlying aquifer as a source of drinking water was also considered. Potential exposure of ecological receptors was weighed, but direct exposure pathways did not appear to be relevant. Recommendations for cleanup were based on the presence of vinyl chloride and pesticides in an aquifer which could be directly used as a source of drinking water.

Evaluation of USEPA Methodology to Derive Maximum Contaminant Level Goals of MCB:

ROUX ASSOCIATES evaluated the methodology used by USEPA to establish its maximum contaminant level goal (MCLG) for monochlorobenzene (MCB). This scope of work was performed when sampling a deep water supply well during a pre-acquisition site investigation in Puerto Rico indicated the presence of MCBs (less than 1 ppm). It was found that the USEPA's MCLGs were inappropriately derived for the site. A site-specific MCLG was calculated, and an adequate margin of safety was determined at the site. Tentative conclusions were offered on potential risks associated with using ground water as a drinking water supply at distances exceeding 1-mile downgradient from the site.

Evaluation of Wastewater Pre-Treatment Process for Property Investor:

ROUX ASSOCIATES evaluated the design, operation, and regulatory compliance of a New Jersey metal plating facility as part of a property transfer assessment on behalf of an out-of-state potential buyer. The facility installed a water reuse/metals removal plant to control the discharge of heavy metals to the local publicly owned treatment works (POTW). ROUX ASSOCIATES inspected the system, reviewed the engineering

design, and reviewed regulatory files pertaining to the site. Recommendations were provided to the client regarding potential liabilities, and suggestions were made regarding how to reduce these liabilities.

Assessment to Support Connecticut Negative Declarations:

ROUX ASSOCIATES performed a Phase 1 property transfer assessment, plus a Phase 2 assessment including an extensive sampling program at a former paper processing plant which had previously been remediated. Post-excavation soil samples indicated minor amounts of TCA and TCE. Projected cleanup costs were estimated for escrow.

Assessment of Abandoned Truck Distribution Terminal:

ROUX ASSOCIATES conducted a preliminary site assessment to determine potential environmental liabilities for a client interested in acquiring an abandoned truck distribution terminal in New Jersey. The history of the site was investigated, and soils were sampled at the surface and in boreholes. Based upon the findings, the client elected not to purchase the property.

Industrial Plant Investigations:

ROUX ASSOCIATES inspected three plant sites for a New Jersey firm and advised management regarding probable existing conditions, potential for environmental impact, improvements in management practices and additional investigative work that should be undertaken prior to transfer of property ownership.

Property Transfer Investigation:

ROUX ASSOCIATES is investigating a vacant site for the current owner for possible future sale. The site contains several abandoned underground tanks and buried drums which will be excavated. A ground-water and soils investigation is planned.

Industrial Facility Investigation:

ROUX ASSOCIATES implemented an industrial site inspection for a facility owner prior to the tenant's vacating the site. Problems which were not adequately addressed by the tenant were identified. A detailed ground-water investigation was conducted to define the nature and extent of contamination related to activities at the site. A report describing site conditions and recommending future actions was prepared.

Prepared ECRA Initial Notice Forms for an Industrial Facility:

ROUX ASSOCIATES completed ECRA notice forms and prepared an affidavit which demonstrated the absence of hazardous substances at an industrial facility. The sale of the facility was facilitated upon ECRA approval.

Completed ECRA Investigation & Cleanup Plan Initiated by Others:

ROUX ASSOCIATES was retained by the purchaser of a manufacturing facility after NJDEP discovered the presence and possible release of hazardous substances upon final inspection of an ECRA investigation/cleanup program conducted by others. ROUX ASSOCIATES investigated and cleaned up impacted soils, and managed a subsequent waste disposal program. Impacted soils were excavated until photoionization readings indicated an end to contamination. Samples of clean soils were analytically confirmed.

Excavation and Disposal Option Follows Site Assessment:

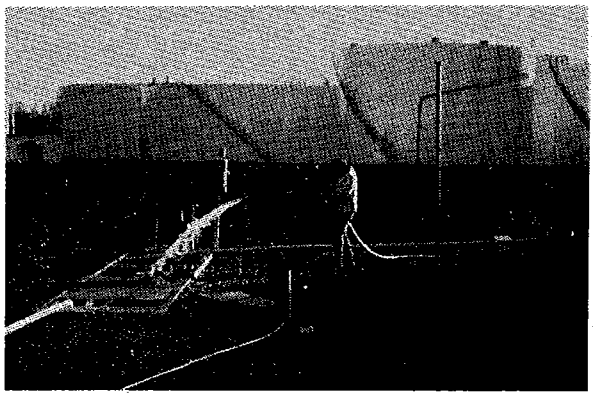
ROUX ASSOCIATES was retained to conduct a preliminary site evaluation of electrical equipment manufacturing plant in Connecticut. After the site history and air photo assessment, 20 soil borings and test pits were made to define areas of contamination. Site remediation required the excavation and disposal of 150 drums of soil which contained solvents, PCBs, and metals. A follow-up investigation using split samples was conducted with the regulatory agency.

Human Health Risk Assessment Regarding Pesticide at Site in Puerto Rico:

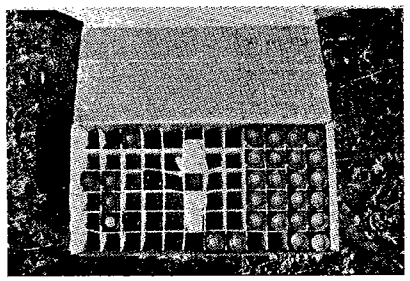
ROUX ASSOCIATES conducted a human health risk assessment when a major pharmaceutical company discovered toxaphene, a pesticide, on farm land it was interested in purchasing for expansion of its current manufacturing facility. The risk assessment evaluated potential human health impacts associated with using the land for recreational purposes, as well as potential impacts to construction workers during grading and other site activities.

RCRA COMPLIANCE

ROUX ASSOCIATES is experienced in all phases of RCRA compliance programs. We design and implement RCRA closure plans, and we perform the various components of RCRA Corrective Action Programs. This includes RCRA Facility Assessments (RFA), RCRA Facility Investigations (RFI), Corrective Measure Studies (CMS), and Corrective Measure Implementations (CMI). ROUX ASSOCIATES is experienced in all related field activities, data validation, permitting, and closure services. These might include:



- Site Assessments
- Hydrogeologic Evaluations of Contaminant Migration
- Ground-Water Modeling
- Closure Plan Preparation
- Solid Waste Disposal and Ground-Water Discharge Permitting
- Non-Hazardous Industrial Waste Landfill Permitting
- Clean-Up and RCRA Closure Services



We also design and implement monitoring programs and evaluate data to determine compliance. A summary of our RCRA experience is presented in this section.

RCRA Part B Application & Closure / Postclosure Plans:

ROUX ASSOCIATES prepared RCRA Part B plans for a hazardous waste landfill in Connecticut. Monitoring wells were drilled and sampled as part of the permitting process. All available information regarding geology, ground-water flow and landfilling practices were used in the preparation of the application.

Hydrogeologic Site Assessment:

ROUX ASSOCIATES prepared a hydrogeologic site assessment for a RCRA permitted waste management area in Indiana. This work was in response to ground-water monitoring results which indicated a significant increase in several monitored constituents.

Wastewater Treatment Lagoon Closure Plans:

ROUX ASSOCIATES developed a closure plan for two RCRA permitted wastewater treatment lagoons at a manufacturing facility in Connecticut. A ground-water assessment was conducted, sludge and underlying sediment were sampled, a plan for removal and disposal of sludge was developed, and a post-closure monitoring program was set up. The lagoons were closed, and long-term monitoring is underway.

RCRA Closure of a Waste Flammable Liquid Storage Pad:

ROUX ASSOCIATES implemented a RCRA closure plan for a waste flammable liquid storage pad in New Jersey. ROUX ASSOCIATES supervised the pad cleaning, and collected soil samples nearby. A soil gas survey was conducted and a boring program was initiated to delineate the possible migration of constituents. No migration was indicated, and the NJDEP approved full closure.

RCRA Closure of a Waste Oil Storage Pad:

ROUX ASSOCIATES implemented the RCRA closure of a former waste oil storage pad at a New Jersey chemical manufacturing facility. A gravel and clay pad was removed and impacted soils were excavated. Stockpiled soil samples were collected for waste

characterization. Sampling of post-excavated soils confirmed the absence of residual contamination, and the NJDEP approved full closure. Stockpiled soils were disposed at an approved, secure landfill facility.

Hazardous Waste Hydrogeologic Investigation:

ROUX ASSOCIATES conducted a hydrogeologic investigation to evaluate possible migration of hazardous waste constituents from a RCRA regulated facility in New Jersey. A final closure plan has been submitted and is under review.

Technical Assistance with Louisiana Disposal Sites:

ROUX ASSOCIATES provided technical assistance in evaluating contaminant transport, designing ground-water monitoring programs, and in developing screening techniques to detect ground-water and soils contamination at four disposal sites in Louisiana. The sites contain volatile chlorinated hydrocarbons, aromatic compounds, and separate organic phases from past waste disposal activities.

Hydrogeologic Investigation in Pennsylvania:

ROUX ASSOCIATES conducted a hydrogeologic investigation in response to measured releases of a hazardous substance from a RCRA regulated facility in Pennsylvania. A ground-water monitoring program was established.

Upgradient Contaminant Movement Investigation in Texas:

ROUX ASSOCIATES investigated the sources and migration extent of hazardous waste constituents from a RCRA regulated facility in Texas. The apparent upgradient movement of contaminants was demonstrated to be caused by water table mounding beneath an adjacent non-hazardous wastewater pond. A long-term monitoring program with properly located upgradient wells was developed.

RCRA Corrective Action Program:

ROUX ASSOCIATES investigated a former RCRA-regulated waste storage area in New

York to determine the possibility of soil or ground-water contamination as part of a RCRA Corrective Action inspection. The project is on-going.

NJPDES Discharge-To-Ground Water Permit:

ROUX ASSOCIATES evaluated the source, extent, and potential impact of volatile organic compounds in ground water from an investigation initiated by others. An underground waste oil tank was removed under an approved RCRA closure plan, and a NJPDES Discharge-To-Ground Water Permit was issued. Tasks completed by ROUX ASSOCIATES to date include the installation of additional wells (including a cluster well set to evaluate any interaction between shallow and deep water zones), routine sampling for trend evaluation, and pump testing to determine local aquifer characteristics. Remedial alternatives for site cleanup were considered. Jet grouting, which solidified the soil within the tank field, was implemented as the most appropriate and cost-effective alternative. Closure has been proposed to the NJDEP.

Permit Application Support:

ROUX ASSOCIATES conducted a detailed soils and hydrogeologic investigation in support of the successful permit application for a non-hazardous industrial waste landfill in upstate New York. The landfill was shown to have little impact on the underlying aquifer due to the presence of low permeability till. In addition, the attenuation capacity of the till inhibited the horizontal movement of solutes to a nearby river.

Landfill Proposal Evaluation:

ROUX ASSOCIATES evaluated the suitability of a parcel of land in Connecticut for a non-hazardous industrial waste landfill. ROUX ASSOCIATES predicted the impact of the proposed landfill on ground-water and surface-water quality. The findings and conclusions were explained at public hearings. Solid waste disposal and ground-water discharge permits were granted.

Monitoring Program at Proposed C&D Landfill:

ROUX ASSOCIATES developed a monitoring program consistent with New York State regulations for solid waste disposal facilities. The site was impacted by jet fuel from an upgradient tank farm release, and is on the state Superfund list (Class 2A).

Evaluation of Closure of Surface-Water Impoundments:

ROUX ASSOCIATES was retained by a Connecticut manufacturer to assess the impact of two closed wastewater impoundments under a RCRA monitoring program. The project required quarterly monitoring and statistical evaluation of ground-water quality data. ROUX ASSOCIATES submits annual reports to USEPA and the Connecticut DEP.

VI and RFI at Chemical Plant:

ROUX ASSOCIATES was awarded a contract to conduct a RCRA verification investigation (VI) and RCRA Facility Investigation (RFI) at a production facility of a major chemical company. The VI will focus on a former hazardous waste incinerator, and the RFI will focus on several solid waste management units located throughout the plant. The implementation of the VI plan is pending USEPA approval. The RFI will be conducted after the VI.

Technical Support in RCRA Compliance Management:

ROUX ASSOCIATES provided management consulting services in the development of an integrated waste disposal program for a major oil company. The objectives of the project were to minimize long-term liability, to develop client-specific criteria for the evaluation of hazardous waste TSD facilities, and to develop a waste disposal program which facilitates compliance with federal and state record-keeping and reporting requirements. In this regard, ROUX ASSOCIATES developed and prioritized criteria for the selection of TSD facilities, prepared a guidance manual for the client's contractors to ensure compliance with RCRA and state waste disposal requirements (classification, manifesting, transportation, disposal, record-keeping),

and prepared a generator reporting and tax filing guidance manual for the client's environmental staff.

RCRA TCLP Determination of Hazardous Wastes for a Major Oil Company:

ROUX ASSOCIATES was retained to determine whether soil samples at a petroleum storage terminal undergoing bioremediation were deemed hazardous for benzene and lead, based upon TCLP analysis. TCLP was published as a final rule in 1990 to replace the Extraction Procedure Toxicity Test for the evaluation of toxicity hazardous characteristics under RCRA. Three random grab soil samples were collected for benzene analysis by USEPA Method 1311/8240, and for lead analysis by USEPA Method 1311/6010. The analytical results were below the detection limit for benzene (0.05 mg/l) and lead (0.1. mg/l) in all three samples. The soil samples were deemed non-hazardous with respect to benzene and lead.

Corrective Action Determination at Solid Waste Management Units:

ROUX ASSOCIATES investigated two solid waste management units at a New York City facility to address RCRA Corrective Action requirements. Based upon analytical results of samples taken at the source area and in nearby soils, USEPA decided that corrective action was not required.

ROUX

Professional Profile

Paul Roux
President

Technical Specialties:
Ground-water/soil contamination investigation and remediation. Environmental site assessment. Water resources management.

Experience Summary:
Over 20 years of experience: President of Roux Associates, Senior Hydrogeologist at Stauffer Chemical Co., and various hydrogeological positions at Geraghty & Miller. Directed and participated in RI/FS studies, environmental impact statements, water quality and contaminant mobility studies, ground-water assessments, technical support for legal counsel, expert witness, regulatory agency negotiations.

Credentials:
M.A. Geology, Queens College, City University of New York, 1978.
B.S. Engineering Science, C.W. Post College, Long Island University, 1968.

Certified Professional Hydrogeologist, A.I.H.
Certified Professional Geologist, A.I.P.G.
Certified Professional Geologist, Indiana, North Carolina, Florida, Delaware, Arkansas, and Tennessee.

Professional Affiliations:
National Ground Water Association
American Institute of Professional Geologists (Northeast Executive Committee, '80-82)
American Institute of Hydrology

Publications:
16 papers for GSA, Ground Water, Ground Water Monitoring Review, USEPA, Pollution Equipment News, Various Seminars (Columbia University, National Water Well Association, Hazpro Conference). Topics include ground-water contamination and monitoring, leachate migration, aquifer decontamination, waste disposal impacts on ground water, resistivity and conductivity surveys, procedures manuals, site assessments, in-situ remediation, sensitivity analysis for pesticides.

Key Projects:
- Principal-in-charge of remedial investigation feasibility studies for several hazardous waste sites listed on the National Priorities List, and for several state Superfund sites.
- Principal-in-charge of several studies to define areas vulnerable to ground water contamination from pesticide application. Planned and supervised a major herbicide leaching study in eight states, and testified on the results to the EPA Science Advisory Panel.
- Principal-in-charge of a large-scale well sampling program to determine the potential for pesticide leaching under various soil and hydrogeologic conditions.
- Evaluated ground-water conditions at over 100 industrial plant sites throughout the U.S. to determine existing and potential problems.
- Developed ground-water contamination abatement systems and monitoring programs at numerous industrial sites.
- Advised client management on corporate responses to ground-water portions of RCRA, SDWA (UIC), and CERCLA.
- Negotiated ground-water and hazardous waste matters with EPA and state regulatory personnel in ten states.
- Served on Chemical Manufacturers Association's Ground-water Management and Superfund Task Groups.
- Determined the effectiveness of an emergency cleanup of a 7,000 gal. PCB spill near a NJ public supply well field.
- For USEPA, evaluated impact of waste disposal facilities on ground-water resources of Gloucester and Camden counties, New Jersey. Conducted a similar project for Westchester County, New York.
- Implemented numerous water supply development projects. Clients included Shell Oil, Union Carbide, Puerto Rico Water Resources Authority, East Orange and Fairlawn townships in New Jersey, and Middletown and Weston townships in Connecticut.
- Designed ground-water removal and re-injection system for in-situ bioreclamation programs at several locations.

ROUX

Professional Profile

John R. Loper, P.E.
Vice President/Principal Engineer

Technical Specialties:
Investigation and remediation of ground-water and soil contamination problems. Environmental audits and site assessments. Waste minimization and control.

Experience Summary:
18 years of experience: Vice President of Roux Associates, Business Director of Aquifer Remediation Systems, and a variety of environmental, marketing, safety, and manufacturing positions at FMC Corporation. Directed and participated in RI/FS studies, RCRA investigations and closures, ECRA investigations and cleanups, NPDES audits and treatment system designs, SARA Title III evaluations, waste minimization surveys, air permitting and environmental impact studies, water and soil treatment system design and operation, regulatory agency negotiations, and expert witness testimony.

Credentials:
M.S. Chemical Engineering, West Virginia College of Graduate Studies, 1979
B.S./B.A. Chemical Engineering/Applied Science, Lehigh University, 1973
Professional Engineer (PA, NJ, NY)
Licensed N-2 Industrial Wastewater Treatment System Operator (NJ)
Certified to Perform UST Services (NJ)
Tau Beta Pi (Engineering Honors Society)
Phi Beta Kappa (National Honors Society)
Who's Who in Finance and Industry (1993), in the East (1992) and Among Rising Young Americans in American Society & Business (1992)

Professional Affiliations:
National Society of Professional Engineers
American Institute of Chemical Engineers
National Ground Water Association
Environmental Law Institute
American Water Works Association
Water Pollution Control Federation

Publications:
A Guide to ECRA, Roux Associates, 1986.
In-Situ Treatment of Ground Water - Presented at Hazardous Materials Spills Conference, 1986.
In-Situ Ground-Water Remediation (Hazpro '85).
Real World Tips from a Veteran Oil Marketer - Presented at U.S. Oil Week Seminar, 1993.

Key Projects:
- Principal-in-charge for design and operation of numerous vapor extraction, carbon adsorption, air stripping, and in-situ chemical and biological treatment systems throughout the United States.
- Principal-in-charge of investigation and remediation of petroleum hydrocarbon contamination problems at retail gasoline stations and distribution terminals.
- Principal-in-charge of ECRA investigation and cleanup programs in New Jersey.
- Principal-in-charge of remedial investigations and feasibility studies for NJ hazardous waste sites.
- Managed and directed soil and ground-water investigations at industrial facilities throughout the country.
- Managed and directed removal of underground storage tanks and subsequent investigation and remediation programs in the Northeast.
- Developed and implemented RCRA Closure Plans for waste storage facilities in New Jersey.
- Managed and directed numerous feasibility studies for removal and treatment of petroleum hydrocarbons, solvents, coal tar chemicals, heavy metals, and agricultural chemicals.
- Developed methodology for assessing toxic chemical release rates for SARA Title III compliance at NJ chemical manufacturing facilities.
- Provided compliance assistance and support for air, water, solid waste, and fire safety permitting programs in New Jersey.
- Conducted a waste minimization study for major chemical manufacturer to achieve compliance with NJPDES/SIU permit requirements.
- Negotiated air, water, and solid waste matters with EPA and regulatory agencies in NJ, PA, DE, MD, NY, MA, CT, CA, AK.
- Directed new business venture to develop and commercialize in-situ treatment technology of contaminated soils and ground water.
- Directed technical support for start-up of $10MM pollution abatement equipment program to meet NPDES discharge requirements at a chemical manufacturing facility.

ROUX

Professional Profile

William Sarni
Vice President/Principal Hydrogeologist

Technical Specialties:
CERCLA Programs. Hydrocarbon Investigations and Remediation. Borehole Geophysics.

Experience Summary:
16 years of experience: Vice President of Roux Associates Inc; Associate with Geraghty & Miller Inc; Exploration Geologist with ARCO Exploration; Assistant Project Geologist with D'Appolonia Consulting Engineers. Managed and participated in RI/FS programs, hydrocarbon investigations and remediation, water supply development, and site assessments. Experienced in well installation and sampling methods, surface and borehole geophysical techniques, subsurface geological mapping, and computer applications.

Credentials:
M.A. Earth & Environmental Sciences (Geology),
1981 Queens College, CUNY.
B.A. Earth & Environmental Sciences (Geology),
1975 Queens College, CUNY.

Professional Affiliations:
Association of Ground Water Scientists and Engineers
International Association of Hydrogeologists
Colorado Mining Association
American Association of Petroleum Geologists
American Geophysical Union
Environmental Law Institute

Registrations:
American Institute of Professional Geologists (No. 5092)
State of Florida (No. 494)
State of North Carolina (No. 256)

Key Projects:

- Extensive experience in the development of litigation and compliance related issues, such as developing monitoring programs to satisfy USEPA and state requirements, determining the adequacy of Work Plans developed by other consultants, providing assistance and representation for PRPs in the negotiation of Consent Orders, implementing Work Plans and remedial actions.

- Managed a multi-million dollar USEPA Superfund Remedial Investigation/Feasibility Study at a 5200 acre industrial site in Colorado.

- Principal-in-Charge of a Pre-Design Investigation at an NPL listed Superfund site in Woburn Massachusetts. Purpose was to obtain field data to support the design of a ground-water recovery, treatment and re-injection system.

- Principal-in-Charge of a surface-water, stream sediment, and ground-water investigation to support a risk assessment and focused Feasibility Study at an NPL listed Superfund site in Woburn Massachusetts.

- Principal-in-Charge of a Remedial Design Program at an NPL listed Superfund Site in Woburn Massachusetts. The program included the design of a ground-water recovery, treatment and re-injection system and the use of numerical modeling to simulate aquifer conditions.

- Supervised the installation and monitoring of a uranium mill tailings dam dewatering system in New Mexico.

- Assisted with the relicensing of a uranium mill and mine in New Mexico. Tasks included the evaluation of ground-water quality and hydrogeologic data.

- Managed a hydrogeologic investigation to permit a landfill site at an abandoned coal strip mine in West Virginia. Tasks included well design, drilling supervision, aquifer tests and data analysis, water sampling and supervision of a seismic refraction survey.

- Principal-in-Charge of several hydrocarbon investigation and remediation projects to comply with UST regulations.

- Principal-in-Charge of ECRA clean-up programs at petroleum terminals in New Jersey. Projects included the bio-remediation of soils and the recovery and treatment of groundwater.

- Principal-in-Charge of a Site Assessment which required the investigation of groundwater contamination, the design of a recovery and treatment system, and a building decontamination program.

ROUX

Professional Profile

Steven J. Anderson
Director/Principal Engineer

Technical Specialties:
Groundwater/soil contamination investigations and remediation. Hazardous material and hazardous waste management. Environmental compliance assessments. Waste treatment and minimization. Thermal oxidation systems.

Experience Summary:
14 years of experience: Principal engineer and Western Region Director of Roux Associates, Inc.; Associate with Camp, Dresser & McKee; President of Exceltech, Inc.; Program Manager with Acurex Corporation. General environmental management experience specializing in oversight and implementation of multi-disciplinary projects involving hydrogeologic investigation, remedial cleanup engineering, facility closures, hazardous waste treatment, economic feasibility studies, and regulatory permitting.

Credentials:
M.S., 1978, Chemical Engineering, Massachusetts Institute of Technology
B.S., 1976 Chemical Engineering, Stanford University

Professional Engineer (California)
Licensed Contractor (California)
Tau Beta Pi (Engineering Honors Society)

Key Projects:

- In a senior technical capacity, managed engineering and geology teams implementing compliance of over 200 UST sites in California and Arizona. Work activities encompassed tank removals, soil excavation and treatment (in-situ vadose zone aeration, in-situ and ex-situ biodegradation), groundwater extraction and treatment (air strippers/carbon beds), tank monitoring systems, and closure plans.

- Principal-in-Charge of numerous industrial facility closure programs encompassing site assessments, closure plan preparation, building decontamination, and soil/groundwater remediation.

- Managed petroleum refinery PCB decontamination project which employed an innovative solvent flushing and recycling unit to cleanse heat transfer equipment contaminated with PCB's. The solvent recovery unit reduced conventional waste disposal volume by over 90 percent.

- Design, construction, and operation of thermal, chemical, biological, and physical treatment systems for processing a variety of hazardous waste streams including contaminated soils and groundwater, industrial wastewater, spent solvents, and PCBs. Specific projects included: design, engineering, construction, and startup of a 100 gpm wastewater treatment facility for a major semiconductor facility; development and construction of a mobile chemical dechlorination process for polychlorinated biphenyls; implementation of a soil fixation process that successfully achieved maximum TCLP levels for heavy metals.

- Performed comprehensive economic technical feasibility studies of hazardous waste treatment processes and cleanup technologies. Feasibility studies included process conceptual design, capital cost estimates, operation and maintenance expenses, cash flow, and risk management.

- Implemented a comprehensive environmental compliance program for a major industrial food processor and distributor with over 20 separate locations in California. The compliance program addressed all applicable regulatory requirements associated with hazardous material management, hazardous waste management, water and air discharges, and worker protection. Analyzed and developed long-term environmental compliance strategies addressing internal organizational resource requirements.

- Performed technical and economic feasibility study of volatile organic hydrocarbon destruction unit for a major laminate board manufacturer. Recommended a thermal regenerative system that reduced operating cost compared with the existing wet scrubber and could be completely funded through sale of emission offsets.

- Designed and constructed a 15 acre impervious cap for containing pesticide contaminated soils.

- Designed, constructed, and operated a mobile PCB dechlorination system permitted by the USEPA.

- Constructed and successfully implemented one of the first in-situ bioremediation processes approved in the State of California.

- Successfully permitted a petrosoil treatment facility by obtaining all CEQA approvals.

ROUX

Professional Profile

Douglas J. Swanson
Manager of New York Office/Principal Hydrogeologist

Technical Specialties:
RI/FS studies. Ground-water remediation system design and implementation. Aquifer testing. Expert testimony.

Experience Summary:
9 years of experience: Principal Hydrogeologist at Roux Associates, Senior Hydrogeologist at Dan Raviv Associates, and Staff Hydrogeologist at Geraghty & Miller.

Credentials:
M.S. Geology, West Virginia University, 1983.
B.S. Geology, Hofstra University, 1981.

Professional Affiliations:
Assoc. of Ground-Water Scientists and Engineers

Key Projects:

- Expert witness and principal-in-charge of five RIs in Pennsylvania and North Carolina in connection with a National Contingency Plan (NCP) cost recovery litigation case.

- Principal-in-charge of the investigation and remediation of a multi-million gallon release of separate phase petroleum underlying a section of Brooklyn, New York. The project included plume delineation, ground-water modeling, and the engineering design of a large-scale interceptor well and ground-water treatment system.

- Principal-in-charge of multi-million dollar ECRA site cleanups at two oil terminals in New Jersey. The projects required the design of ground-water recovery and treatment systems to mitigate separate phase and dissolved ground-water contamination. Also designed on-site bioremediation of 15,000 cubic yards of petroleum-contaminated soils.

- Principal-in-charge of an RI/FS at a railroad yard in Queens, New York. The project includes a large-scale soil and ground-water investigation, risk assessment and evaluation of remedial alternatives.

- Project manager of a federal Superfund site investigation in Woburn, Massachusetts. The project is comprised of a large-scale ground water and surface water RI/FS, a human health and ecological risk assessment and a metal mobility study.

- Principal-in-charge of a ground-water remediation project in a residential area of Babylon, New York. The project included the design, installation and operation of a ground-water recovery and treatment system to mitigate separate phase and dissolved organics.

- Managed an NJDEP Enforcement investigation to delineate and remediate coal tar contamination in soil and ground water at a former coal gasification plant in Jersey City, New Jersey. Tasks included the management of a large-scale soil and ground-water remedial investigation, the design of a ground-water remedial system to capture floating and sinking separate phase product in shallow and deep aquifers, and the supervision of an in-situ bioremediation program to remediate coal tar wastes.

- Designed ground-water recovery and treatment systems for unconsolidated and bedrock aquifers for multiple sites in New York, New Jersey and Colorado. Ground-water recovery designs included interceptor trenches, single and multiple recovery well systems, and reinjection trenches. Treatment system designs included oil/water separation, air stripping and carbon adsorption.

- Managed an ECRA investigation to delineate and remediate heavy metals contamination in soils and ground water at an industrial site in Somerset, New Jersey.

- Managed a CERCLA investigation to determine the extent and impact of contamination in fractured crystalline and sedimentary bedrock aquifers underlying an industrial site in Denver, Colorado.

- Managed a ground-water investigation to recover separate phase fuel oil from a water table aquifer at a railroad yard in Denver, Colorado. Tasks included the design of a remedial plan and preparation of a COPDES discharge permit application for the site.

- Developed and directed a source characterization study of buried waste ponds at an industrial site in Denver, Colorado. Soil chemistry, ground-water quality and bench-scale treatability test data were developed to determine impact of source materials on the ground-water system and to identify remedial technology alternatives for site cleanup.

ROUX

Professional Profile

H. Patrick Penders
Manager of New Jersey Office/Principal Scientist

Technical Specialties:
Evaluation, design, and installation of subsurface remediation systems for soil and ground water. Remedial investigations and feasibility studies of hazardous waste sites.

Experience Summary:
12 years of experience: Principal Scientist and Office Manager at Roux Associates, Senior Scientist and Project 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 RCRA, RI/FS, NPDES, BUST, ECRA, and Superfund investigations and remediations.

Credentials:
B.S. in Marine Science, Stockton State College, Pomona, New Jersey, 1978
University of Texas A&M, Hazardous Material Control Course
OSHA Health, Safety, and Supervisor Training

Key Projects:
- 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.
- Provided senior and principal participation during feasibility studies pertaining to the removal and treatment of chlorinated compounds, petroleum hydrocarbons, PCBs and heavy metals.
- Directed and managed remedial investigation programs in New Jersey and Pennsylvania for PCBs, petroleum hydrocarbons, metals and solvents.
- 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 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.
- Principal in Charge and negotiated numerous NJ-ECRA investigations including submission and execution of clean-up plans under NJDEPE oversight.
- Management and negotiation of multi-disciplinary remediation of bulk oil storage facilities located in New Jersey under the NJ-ECRA program. The projects involved bio-remediation of petroleum contaminated soils, and the recovery and treatment of ground water.
- Supervised field and final design of numerous vapor abatement projects for residential and commercial structures.
- Designed and managed emergency dewatering of contaminated ground water at petroleum service stations and industrial facilities.
- 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.
- Managed and participated in decontamination of industrial structures containing PCBs, lead, mercury, and pesticides.
- Coordinated hazardous waste disposal projects for 9 years and managed numerous drum excavation projects containing hazardous materials.

ROUX

Professional Profile

Neil R. Rivers
Principal Scientist

Technical Specialties:
Remedial investigations and feasibility studies at hazardous waste sites. Property transfer-related environmental assessments. Hazardous waste treatment and disposal technologies. Low temperature thermal desorption. Biological wastewater treatment.

Experience Summary:
12 years of experience: Office Manager for Roux Associates, Vice President at Environmental Compliance Services, Project Engineer at Roy F. Weston, and Technical Supervisor at NVF Company.

Credentials:
B.S. Biology, Widener University, 1980.
28 M.S. credits in Environmental Engineering.
Licensed Industrial Wastewater Treatment Operator.

Key Projects:

- Project Manager for an ECRA investigation and cleanup program at a petroleum distribution terminal in New Jersey. The remedial program included the treatment of 18,000 cubic yards of soil by thermal desorption, ground-water remediation, asbestos abatement and the installation of a storm water discharge system.
- Lead Project Engineer for a $1.4 million RI/FS at a wood treating site and for a $1.6 million RI/FS at a drum disposal site. Both projects were on the Superfund NPL. Site contaminants included polynuclear aromatics, pentachlorophenol, dioxins, acids and volatile organic compounds.
- Principal-in-Charge of oversight and auditing of hazardous waste site remedial activities. Prepared reports for the contractor's pollution liability insurance carrier based upon field audits and report evaluations.
- Principal-in-Charge of property transfer-related environmental evaluations.
- Project Manager for investigation and remediation projects at retail gasoline stations in Maryland and Pennsylvania. Designed, constructed and operated a ground-water treatment and recovery system.
- Lead Engineer responsible for the administration and technical review for a $40 million USEPA CERCLA project.
- Principal-in-Charge of environmental claims investigations for a national insurance carrier.
- Lead Project Engineer for the identification, evaluation, and ranking of environmental liabilities at over 100 U.S. Army facilities.
- Technical Supervisor managing the operation of an activated sludge waste water treatment system, a heavy metals precipitation/sedimentation treatment system, and a hazardous waste neutralization system.
- Lead Project Engineer for a remedial investigation/feasibility study focusing on PCB contamination of the Red Clay Creek in southeastern Pennsylvania.
- Presented seminars on the USEPA CERCLA program, environmental property transfer assessments, thermal desorption, underground storage tank release response, health and safety issues during hazardous waste site operations, and the reduction of environmental liabilities through management practices and insurance.
- Principal-in-Charge of studies evaluating the environmental risk associated with various hazardous waste treatment, storage and disposal facilities. Prepared recommendations to reduce potential environmental liability and assisted in implementation.
- Project Manager for the development of hazardous waste management guidance manuals for a major petroleum refining and distribution company. Prepared guidance manuals to direct oil company and contractor personnel in hazardous waste manifesting, TSDF selection, generator reporting and disposal tax filing.
- Lead Project Engineer for an environmental compliance audit at an agricultural chemicals research facility in Greenville, Mississippi.
- Project Manager for the Feasibility Study at an industrial site in New Jersey. Site contaminants include chlorinated VOCs and heavy metals. Remediation of a bedrock aquifer, wetlands, and soils will be required.

ROUX

Professional Profile

Timothy G. Baumann
Principal Scientist/Manager Colorado Office

Technical Specialties:
Technical and administrative management of CERCLA/SARA RI/FS projects in the Rocky Mountain Region. Planning and implementation of environmental programs for Clean Water Act, Clean Air Act, and NEPA. Environmental permitting, monitoring and mitigation studies at hazardous waste, mining, water resources, and industrial sites.

Experience Summary:
19 years of experience: Principal Scientist/Office Manager at Roux Associates; Principal Scientist/Branch Manager for CDM Federal Programs; Regional Manager for CDM's EPA ARCS Contract. Research Scientist: Colorado Dept. of Natural Resources, US Fish and Wildlife Service, US National Park Service.

Credentials:
M.S. Wildlife Biology, Colo. State University, 1978.
B.S. Biology, University of Miami, 1972.
Certified Wildlife Biologist, 1983.

Professional Affiliations:
Society of Environmental Toxicology and Chemistry
American Association for the Advancement of Science
Colorado/Wyoming Academy of Science
Colorado Hazardous Waste Management Society

Key Project Experience:
Hazardous Waste Remediation:

- Project Manager for Remedial Investigation and Feasibility Study efforts involving ground water, surface water, stream sediment, human health risk assessment, and ecological assessment efforts for the USEPA #5 NPL site in Massachusetts.

- Project Manager for RI/FS technical support at the Silver Bow Creek/Butte Area NPL Site. Responsible for management of technical efforts addressing mine flooding, heavy metal contamination, and emergency response actions. Scoping and implementation of studies to address public health and environmental risk assessment, evaluation of remedial alternatives and community relations activities. Management of sampling, analytical, and data QA/QC activities.

- Project Manager for subsurface investigations and remedial design at a petroleum hydrocarbon (asphaltic waste) site in Northern California.

- Project Manager for a comprehensive environmental audit and subsurface investigations at an abandoned railyard in northern Texas.

- Project Manager for planning efforts associated with four CERCLA NPL sites in Montana under contract to the USEPA. Issues addressed include: inter-site coordination of remedial activities, sampling and analytical approaches, evaluation of remedial alternatives, phasing of work activities and community relations efforts.

- Project Manager for CERCLA RI/FS (Technical Assistance) at Defense Depot Ogden, Utah, and joint RCRA/CERCLA RI/FS activities at the Tooele Army Depot, Tooele, Utah.

Mining and Minerals Industry:

- Project Manager and Principal Investigator for multidisciplinary baseline, impact, and mitigation feasibility studies leading to an EIS for a coal surface mine in Colorado.

- Project Manager for a multidisciplinary DOE feasibility study for a tar sands surface mine and plant. Responsible for permit requirements, baseline study design, and impact and mitigation assessments.

- Principal Investigator responsible for input to five EIS and four EA documents prepared for mining projects in the Rocky Mountain region. Prepared baseline and siting studies, impact and mitigation evaluations, biological assessments and mitigation/reclamation assessments for wetlands and other terrestrial habitats.

- Supervision of terrestrial and aquatic ecology baseline and endangered species studies in MT, WY, CO, AZ, TX, GA, and FL.

Water Resources:

- Project Manager for CWA Section 404 permitting studies and preparation of an Individual Permit Application for a wetland fill associated with industrial development in Indiana.

- Project Manager for an environmental assessment and mitigation plan for operational modifications at Boulder Reservoir in response to the need for increased storage capacity in Colorado.

ROUX

Professional Profile

Simon Lock, Ph.D., DABT
Director of Risk Assessment and Toxicology Services

Technical Specialties:
Health and environmental risk assessments. Exposure assessments. Toxicological effects of chemicals in environmental media.

Experience Summary:
16 years of experience: Director of Risk Assessment and Toxicology Services at Roux Associates, Senior Technical Associate and Project Manager at IT Corporation, Research Associate and Information Specialist at Oak Ridge National Laboratory, Medical Research Associate at Roussel (Canada) Ltd. Directed and participated in health and environmental risk assessments for CERCLA sites, environmental impact statements for permitting hazardous waste incinerators, occupational risk assessments associated with PCB fires, technical support to legal counsel and agency negotiations.

Credentials:
Ph.D., Pharmacology/Toxicology, U. Montreal, 1979
M.Sc., Pharmacology/Toxicology, U. Montreal, 1976
B.Sc., Pharmacology, U. London, 1974
Diplomate of the American Board of Toxicology.
Over forty toxicological publications and presentations in peer reviewed journals and books.

Professional Affiliations:
Society for Risk Analysis, Society of Toxicology, Society of Environmental Toxicology and Chemistry, American Society for Testing and Materials (Subcommittee on Risk Assessment), Editorial Board of 'Toxicology', Editorial Board of 'Journal of Toxicology and Environmental Health'.

Key Project Experience:
Remedial Investigation/Feasibility Study (RI/FS):

- Public health evaluations as part of the RI/FS process at NPL and State Superfund sites.
- Public health evaluations for wood treatment facilities. Sites had extensive presence of phenols, chlorinated hydrocarbons and heavy metals in soil and ground water.

Risk-Related Liability Assessments:

- Risk assessments to bracket the potential for long term health risks associated with the presence of PCBs in manufacturing facilities. Occupational exposures were estimated and recommendations for cleanup criteria were made based upon the present and intended use of the plant. Litigation support was also provided.
- Evaluation of sites posing potential public or occupational health hazards as a result of the presence of heavy metals.
- Prepared health risk assessment approach for methylene chloride using a pharmacologically based pharmacokinetic model. The approach was used by a client to negotiate site-specific emission criteria.

Emergency Response:

- Site-specific health risk assessments for defining cleanup criteria for PCBs, dioxins, and furans following fires involving PCB-containing transformers or capacitors.
- Health complaints following the venting of a tank car containing urea-formaldehyde concentrate resulted in the evacuation of a community. An evaluation of the causative agents lead to a plan for a cost-effective cleanup program.
- An initial assessment of health and environmental impacts and recommendations for further investigative studies associated with the presence of chlorinated solvents and phthalates in ground water at a chemical plant in the Netherlands.

Permitting Support:

- Assessment of the potential public health risks associated with emissions from proposed hazardous waste incinerators as part of the design and permitting process.

Litigation:

- Analysis and rendering an opinion on the strength of the data available for conducting a health risk assessment as part of a litigation support program for a major environmental impairment suit.
- Expert witness regarding the human health and environmental impacts associated with wastes at former manufactured gas plant sites.
- Review of data at a PCB spill site to provide expert opinion on activities conducted by the plaintiff.
- Preparation of a rebuttal report to an expert opinion prepared by a witness for the plaintiff.

Information Research:

- Prepared comprehensive summaries on selected chemicals for Federal and State government agencies that included environmental and health effects, current standards for worker protection and regulations regarding permissible levels in air and water.

ROUX

Professional Profile

Michael A. DeCillis
Corporate Director of Ground-Water Modeling/ Principal Hydrogeologist

Technical Specialties:
Quantitative analyses of hydrogeologic systems. Modeling of hydrogeologic environments. Investigation and remediation of ground-water and soil contamination. Management of water resources.

Experience Summary
17 years of experience: Corporate Director, Ground-Water Modeling Group of Roux Associates; previously Corporate QA/QC Officer of Roux Associates; Associate/Principal Hydrogeologist and member of G & M Modeling Group with Geraghty & Miller; Hydrogeologist with Environmental Associates. Modeling of ground-water flow and solute transport in unconsolidated and consolidated flow systems. Participated in resource development and soil/ground-water projects. Provided technical support for legal counsel and expert witnesses, and served as an expert witness. Involved in negotiations with regulatory agencies.

Credentials:
M.S. Hydrogeology and Earth Science, Adelphi, 1980
B.S. Earth Science and Biology, Adelphi, 1976
EOS and Master Thesis on ground-water flow and solute transport models.

Certified Ground-Water Professional: AGWSE/NGWA
Certified Professional Geologist: AIPG
Registered Professional Geologist: IN; TN; AK; WY; AR; KY; DE
Who's Who in Science and Engineering, 1992-1993

Prepared and presented modeling section at Geraghty & Miller's Ground-Water Contamination seminars.
Assisted in preparation of Dr. Robert Cleary's IBM PC Applications in Ground Water Pollution and Hydrology course.
Prepared and presented ground water flow and transport presentations at NGWA Eastern Regional Ground Water Conference.

Professional Affiliations:
American Geophysical Union
National Ground Water Association (NGWA)
American Assoc. for the Advancement of Science
American Society of Testing Materials
Environmental Engineering Geophysical Society
New York Academy of Sciences

Key Projects:
- Principal Modeler, ground-water flow and solute transport modeling at Superfund, municipal, industrial sites, and water supply sites impacted by organics, hydrocarbons, PCBs, metals, and radionuclides. Strategies were developed to contain and/or clean-up aquifers, protect water supply wells, and prohibit impact on surface-water bodies including, containment of free-phase product for recovery. Modeling was also used for litigation support, directing field investigations, and resource management.
- Quality Assurance/Quality Control (QA/QC) officer, providing technical oversight and guidance in hydrogeologic investigations involving resource development, hazardous waste contamination, pesticides, and modeling.
- Expert witness, providing technical support for litigation involving hydrogeology and contamination of soils and ground water with organics and inorganics.
- Principal Modeler, ground-water flow and transport modeling at an Ohio industrial site impacted by radionuclides. Modeling was used to evaluate fate, transport, and extent of plume under a no-action alternative resulting from radioactive decay, and included assessments of hydraulic containment and recharge remedial scenarios.
- Project Manager, hydrogeologic field investigations of landfills in New York to develop flow-system and water-quality data in support of NYS Part 360 permit application for site closure. Models were also used to evaluate potential migration pathways for contaminants and capture zones for remedial wells.
- Project Manager, ground-water flow modeling of a coastal plain aquifer at a NJ RCRA investigation site. Modeling helped to identify the most effective remedial alternative to control off-site migration of contaminated ground water following closure of a series of waste-water lagoons. Provided direction to additional investigations.
- Principal Developer and Modeler, ground-water solute transport modeling for "generic" and area-specific hydrogeologic environments as in-house guidance tools to evaluate potential migration and plume configurations for organic and inorganic compounds in various hydrogeologic systems. Modeling was undertaken to evaluate impacts on potential downgradient receptors.
- Principal Modeler, ground-water flow model of a fractured bedrock aquifer at a NJ industrial site. The model was part of a consent decree with state regulatory agencies to establish a buffer zone to exclude additional pumpage around the site and surrounding area to maintain a hydraulic barrier to the flow of contaminated ground water.
- Principal Modeler, ground-water flow modeling for resource development in several states. Projects prompted by site contamination, expansion of water supply needs, nearby well field impacts, aquifer yield, artificial recharge and recovery.
- Designed, implemented, and analyzed aquifer tests for sites throughout the U.S. and Puerto Rico.

ROUX

Professional Profile

Robert H. Goodwin, Ph.D.
QA/QC Manager

Technical Specialties:
Environmental geoscience. Management of diversified technical teams. Specialties include geophysical data collection and interpretation, geohazard assessment, and nuclear waste isolatation.

Experience Summary:
20 years of experience: QA/QC Manager with Roux Associates; 10 years with Exxon Production Research Company; Project Manager with D'Appolonia Consulting Engineers; Assistant Professor of Geology with Texas Christian University; Assistant Professor of Geology and Post Doctoral Fellow with University of South Carolina; Research Geologist with Commonwealth Department of Works, Sidney Australia; and Geological Consultant with Oceanic Explorations.

Credentials:
Ph.D., Marine Geology and Geophysics, Sidney University, Australia, 1971.
M.Sc., Stratigraphy, University of New South Wales, Sydney, Australia, 1968.
B.Sc., Geology, Dalhousie University, 1965.

Professional Affiliations:
International Association of Sedimentologists
Society of Economic Geologists

Key Projects:

- Managed a high-resolution geophysical group responsible for geohazards data collection and interpretation for a major petroleum company's world-wide affiliates.
- Proposed and was a major contributor in an industry-wide study resulting in identification of previously unknown near surface structures in the deep Gulf of Mexico.
- Managed a $600,000 marine environmental geology program in California federal waters. Responsibilities included planning, budget development, data collection, interpretation and reporting.
- Planned and implemented an oceanographic and geophysical investigation, including data collection and interpretation, which resulted in relocation of the primary shipping approach to the Suez Canal.
- Managed a team of geologists and geophysicists responsible for geological evaluation of proposed nuclear power plant site in South Korea.
- Coordinated data collection and analysis for offshore and onshore environmental investigations in Northern Iran.
- Led a group formed to investigate coastal processes and the effects of man-made structures on process modification and intensity.
- Directed an environmental team evaluating low level nuclear waste disposal in salt.

Vinod Prabhakar, Ph.D.
Principal Geohydrologist

Technical Specialties:
Diverse experience in the fields of surface and groundwater hydrology/hydraulics, hazardous waste site investigations/remediation and computer modeling of fluid flow in natural and engineered systems.

Experience Summary:
14 years of experience: Senior Science Advisor with Environ; Principal with Brunsing Engineering Associates; Independent Consultant to private industry; Project Engineer with Canonie Engineering; Associate Engineer with Philip Williams and Associates; and Staff Engineer with D'Appolonia Consulting Engineers.

Credentials:
Ph.D., Civil Engineering, University of California, Berkeley, 1988.
M.Sc., Hydraulics Engineering, University of California, Berkeley, 1979.
M.Sc., Geotechnical Engineering, Utah State University, Logan, 1978.
B.Sc., Civil and Environmental Engineering, Utah State University, Logan, 1976.

Professional Affiliations:
American Society of Civil Engineers.
American Geophysical Union.
NWWA Association for Ground Water Scientists and Engineers.
American Water Resources Association.

Publications:
Impacts of Chemicals Left Behind in Vadose Zone Soils Upon Aquifers Outside of Slurry Cutoff Walls. In press.
Transport of Chemicals with Percolating Water in Vadose Zone Soils. In press.
Digital Control for Canal Systems. ASCE Hydraulic Division Journal. In press.
Digital Feedback Control System for Canals. Ph.D. thesis, Hydraulic Engineering Laboratory, University of California, Berkeley, 1988.
Erosion Simulation Model. Utah Water Resources Research Laboratory, 1978.

Key Projects:
- Lead Technical Advisor for COE Superfund site in Palo Alto, California. Conducted hydraulic testing, performed vadose zone chemical transport modeling to help set cleanup levels for soils, designed soil vapor extractions systems, presented results to the regulatory agencies and citizens associations regarding the progress of project work, and carried out ground-water modeling programs for this site.

- Senior Science Advisor to private industrial clients and environmental services firms. Conducted water balance and unsaturated zone pesticide and chemical transport modeling studies in support of risk assessments.

- Senior Engineering Advisor to an environmental services corporation which owns and operates hazardous waste facilities. Evaluated the consequences of landfill clay-liner consolidation that would release moisture to the vadose zone. The rate of moisture release was used as a boundary condition for an unsaturated flow model. The unsaturated flow simulations were then used to formulate a monitoring strategy for the hazardous waste facilities.

- Senior Science Advisor to an environmental services corporation. Prepared a Sampling and Analysis Plan for clean closure of four unlined surface impoundments, and negotiated the plan with EPA, for a hazardous waste facility in Southern California.

- Senior Engineering Advisor for a Plainville, Massachusetts facility impacted by chlorinated solvents. Prepared the conceptual design of a ground-water collection system as part of a feasibility study report, and designed a ground-water collection and monitoring system for a feasibility study report.

- Senior Science Advisor for a mining site near Coalinga, California. Reviewed a remedial investigation and feasibility study report and generated alternatives to the costly remedial option recommended by EPA consultants.

- Independent Consultant in charge of directing numerous site remediation projects. Projects have included the design of source control measures such as slurry walls; soil stabilization; and extraction well field design, installation, and operation. Also designed soil aeration systems to remediate unsaturated zone soils.

ROUX

Professional Profile

Peter J. Gerbasi, P.E.
Principal Engineer

Technical Specialties:
Remedial design and construction management. Feasibility studies for remediation of soil and ground-water. Remedial designs include air sparging; air stripping; biological, physical and chemical treatment; soil vapor extraction and thermal oxidation. Air, ground water and facility permitting.

Experience Summary:
8 years of experience: Principal Engineer with Roux Associates; and Lead Project Engineer at Camp Dresser and Mckee.

Credentials:
B.E., Civil Engineering, Manhattan College, 1985.
M.E., Environmental Engineering, Manhattan College, 1989.
Professional Engineer, State of New York, 1993.

Professional Affiliations:
New York Water Pollution Control Association, Kenneth Allen Memorial Award Co-recipient (1988) and member of the Industrial and Hazardous Waste Committee.
Long Island Association, Environmental Committee.
Water Environment Federation.
Sigma Xi, Scientific Research Honor Society.

Papers and Presentations:
Major Gasoline Spill Remediation Requires Integrated Approach - Coauthored paper presented at the Water Environment Federation's 65th Annual Conference and Exposition, 1992.
Biological Treatment of Petroleum Hydrocarbons - Coauthored paper presented at NWWA/API Petroleum Hydrocarbons and Organic Chemicals in Groundwater Conference, 1991.
Biological Treatment of Gasoline Contaminated Groundwater - Coauthored paper presented at the NWWA/API Petroleum Hydrocarbons and Organic Chemicals in Groundwater Conference, 1991.
Gasoline Contaminated Groundwater Treatment Study - Coauthored paper presented at the 47th Annual Purdue University Industrial Waste Conference, 1992.
Field Testing of Fine Bubble Aeration Systems; Ridgewood, A Case Study - Presented at the 58th Annual Meeting of the New York Water Pollution Control Association, 1986.
Using Leaching Tests to Estimate VOC Availability for Transport in Ground Water - Presented at the 60th Annual Meeting of the New York Water Pollution Control Association, 1988.

Key Projects:
- Lead Project Engineer for the RI/FS, design, and implementation of remedial action projects at hazardous waste sites. Responsibilities included: planning and coordinating on-site investigative activities and health & safety plans; developing, evaluating and reviewing remedial alternatives and providing detailed cost estimates; preparing plans and specifications; and providing operations and maintenance services for the implementation of remedial action.

- Lead Design Engineer for the remediation of a 1-million gallon gasoline spill at the Long Island terminal of a large petrochemical distributor. Responsible for the design of a 1.5-mgd ground-water treatment facility, performing pilot studies for the treatment of metals and volatile organic compounds, and preparing design report. Also responsible for coordinating, performing, and directing the design of processes for biological treatment for removal of VOCs (primarily BTEX), metals precipitation for the removal of iron and manganese, air stripping with vapor phase carbon treatment for the final polishing and removal of VOCs, mixed media filtration, and ion exchange.

- Senior Project Engineer responsible for the design, construction, and operation of a 75 gpm interim remedial measure (IRM) treatment facility which included oil/water separation, chemical injection for pH control, packed tower air stripping, vapor phase carbon adsorption and ground water recharge. Responsible for performing site inspection and administration activities for this $2.5 million construction project.

- Senior Manager and Lead Project Engineer responsible for the implementation and operation of a soil vapor extraction pilot study, and subsequent design of a vapor extraction and treatment facility at an east coast petroleum distribution terminal. Responsibilities included: performing civil and site design and construction services for the 2,000-scfm vapor extraction and treatment facility; designing a continuous emissions monitoring system and quality assurance plan; preparing air emissions permits and mass emissions estimates; and overseeing air modeling efforts.

- Lead Project Engineer responsible for design team implementing a Discharge Prevention and Containment Compliance (DPCC) program at an industrial facility. Performed mechanical process design of a 25 gpm industrial stormwater treatment facility. Processes included influent heating, oil/water separation, direct filtration and liquid phase carbon adsorption.

- Project Manager for all Phase I environmental site assessments preformed for a Long Island bank. Evaluated commercial and industrial properties in preparation for property transfer and made recommendations for further investigative and corrective action activities.

- Principal Design Engineer for the preliminary design of a ground water recharge system as part of the Suffolk County Flow Augmentation Needs Study in New York.

- Engineer for a site utilities study conducted at a national laboratory on Long Island. Assisted in the evaluation of existing wastewater treatment facilities and performed a comprehensive evaluation and computer analyses of the water treatment and distribution system resulting in recommendations for wastewater treatment facility upgrades, water main replacement and water treatment system upgrades.

- Engineer for a U.S. Army Corps of Engineers remediation and construction project in New Jersey. Responsibilities included: predesign site surveys, geotechnical investigations, ground water treatability studies to determine extent of heavy metal and VOC contamination; design of the excavation and removal of contaminated soil; and performance of construction management services during site remediation.

ROUX

Professional Profile

Richard J. Greenwood, P.E.
Principal Engineer

Technical Specialties:
Project and administrative management of large-scale engineering and construction projects required for waste remediation and mining reclamation. Investigation, design and construction management of ground-water and soil remediation programs.

Experience Summary:
15 years experience: Principal Engineer of Roux Associates, Inc.; Regional Operations Manager with Canonie Environmental Services Corp.; Department Manager with Rocky Mountain Geotechnical, Inc.; Assistant Project Engineer with D'Appolonia Consulting Engineers, Inc.; Engineer with CH_2M Hill.

Credentials:
M.S. Geotechnical Engineering, Utah State, 1978
B.S. Civil and Environmental Engineering, Utah State University, 1976

Professional Affiliations:
American Society of Professional Engineers

Registrations:
Professional Engineer: California and Colorado

Key Projects:

- Project Manager for design and construction of ground-water extraction, treatment and reinjection system for remediation of solvents and pesticides at a DOD site in Ogden, Utah.
- Project Manager for design, construction and operation of soil and ground-water remediation at a Superfund site in San Jose, California. Project included both ground-water extraction and vacuum extraction systems with air stripping and vapor phase carbon treatment.
- Prepared detailed hydrogeologic assessment report and developed remedial alternatives at a site in Oakland, California for closure and remediation of abandoned surface impound-contaminated with heavy metals, PAH's and hydrocarbons.
- Project Manager for characterization, interim removal actions and development of remedial alternatives at a pesticide and fertilizer handling and packaging facility in California.
- Project Manager for site assessment and investgation of ground-water contamination at a bulk petroleum storage facility in Richmond, California.
- Project Manager for investigation, design and construction of remedy for an abandoned coal gasification facility in Northern California. Remedy included ground-water extraction and treatment and partial containment through installation of a soil-bentonite slurry wall.
- Project Manager for design and construction of interim remedy for abandoned drum reconditioning facility in residential area impacted with VOC's, heavy metal and vinyl chloride. Conducted emergency removal, dismantling and capping to secure site. Managed the removal of 500 barrels and dismantling/cleaning of tanks and equipment.
- Managed multi-site remedial investigation and feasibility study contract with the State of California Department of Health Services. Sites included abandoned metal plating facilities, pesticide handling facilities, drum reconditioning facilities, and abandoned facilities which used industrial solvents and disposed industrial wastes.
- Project Manager for multi-site investigation and removal of underground storage tanks. Managed removal of over 300 leaking underground tanks. Many of the tanks were located in rugged terrain requiring innovative excavation and disposal techniques. Consolidated and developed system- wide removal contract resulting in time and cost savings.
- Project Manager for design and implementation of interim remedial action at a large drum reconditioning facility in San Jose, California. Project required rapid mobilization and removal of contaminated soils and waste drums to prevent the contamination of the deep water supply aquifer. Excavated and disposed 3,000 cubic yards of soil contaminated with PCBs, pesticides, solvents and heavy metals. Completed the characterization and removal of over 24,000 drums within 3 months.
- Project and Construction Manager for design and construction of soil-bentonite slurry walls for containment of industrial solvents at seven sites in Northern California.

ROUX

Professional Profile

Andrew Baris
Senior Hydrogeologist

Technical Specialties:
Ground-water and soil contamination investigation and remediation. USEPA Superfund program. Environmental Site Assessments and UST investigations.

Experience Summary:
7 years of experience: Project Manager/Senior Hydrogeologist with Roux Associates; Hydrogeologist for USEPA Office of Ground-Water Quality Management. Managed the investigation and remedial design for ground-water contamination caused by USTs. Provided management and technical support to USEPA RI/FS studies. Participated in several real estate transaction investigations.

Credentials:
M.E.S. Ground Water Quality Management, 1986, University of Oklahoma
B.A. Geology, 1985, Geneseo College of Arts and Science, State University of New York

Professional Affiliations:
National Ground Water Association
Association of Ground Water Scientists and Engineers

Key Projects:

- Project Manager for the off-site investigation and remediation of a multi-million gallon spill of petroleum hydrocarbon product near bulk petroleum storage terminals in Brooklyn, New York. Responsibilities included permitting, negotiations with regulatory agencies, oversight of field investigation and remediation system development design, data analysis and report preparation.

- Site Manager for a large-scale Remedial Investigation of a manufacturing facility in Pittsburgh, PA. The project included the installation of 40 monitoring wells and 60 soil borings, aquifer characterization and fate and transport analyses. Responsible for overseeing all site activities, report preparation and regulatory agency coordination.

- Project Manager for the preparation of the conceptual remedial plan, and design drawings and specifications for a remediation system to recover an off-site multi-million gallon spill of petroleum hydrocarbon product near bulk petroleum storage terminals in Brooklyn, New York. The project included numerical ground-water modeling, evaluation of alternatives for recovery well design and ground-water treatment, design of product storage facilities, and permitting negotiations with regulatory agencies.

- Project Manager for the investigation and closure of drywells at 54 service stations in Nassau County, New York. Drywells targeted for closure were those connected to service station floor drains.

- Project Manager for the Phase III investigation of an aerospace manufacturing facility in Connecticut. The investigation delineated the extent of areas impacted by metal finishing wastes and chlorinated solvents. Responsible for work plan development, field investigation oversight, data evaluation and report preparation.

- Manager for performance of a Feasibility Study at a USEPA Superfund site in Massachusetts. Responsibilities included: identification, design, and evaluation of remedial alternatives to address ground-water and sediment.

- Project Manager for investigations at retail gasoline service stations which included monitoring well installation, ground-water sampling, geophysical surveys, aquifer testing, ground-water modeling and recovery system design.

- Performed a soil investigation and historical aerial photograph analysis of a pharmaceutical company property. Responsibilities included field sampling, data evaluation and report preparation.

- Provided technical support to USEPA Superfund Program on the development of Work Plan, RI/FS, and Record of Decision documents for numerous sites in New York and New Jersey.

- Prepared technical exhibits and performed historical aerial photograph analyses for several litigation cases.

- Developed technical support documentation for the federal designation of two sole source aquifers. Reviewed numerous proposed projects for their potential impact on sole source aquifers and recommended appropriate mitigative measures.

- Organized a workshop on the development of State Pesticide Management Plans as called for in the USEPA Agricultural Chemicals in Ground Water Strategy. Served as a moderator during work group discussions.

Patricia Connaughton Burns
Senior Scientist

Technical Specialties:

Design, implementation, and management of remedial investigation projects. Sampling and analytical QA/QC program development. Wetlands and environmental impact studies. Knowledge of NJDEPE regulatory structure and compliance.

Experience Summary:

11 years of experience in environmental and land–use projects: Project Scientist/Project Manager at Roux Associates; Environmental Scientist/Group Manager for BCM Engineers; and Environmental Scientist at USEPA Region IX. Managed remedial investigations of industrial sites. Directed wetlands projects and environmental assessments. Coordinated field and laboratory QA/QC functions.

Credentials:

M.S. Forestry (Soils) Michigan Technological University, 1987.
B.S. Natural Resource Studies, University of Massachusetts, 1980.

Professional Affiliations:

Soil Science Society of America
Society of Wetlands Scientists

Key Projects:

Hazardous Waste Remediation:

- Project Manager and Senior Technical Reviewer 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 and Feasibility Study. Coordinated all administrative and financial activities to meet project schedules, objectives, and budgets.

- Project Manager for several ECRA projects with responsibilities including preparation of initial filings, development of approved sampling plans, management and implementation of field investigations, report preparation, schedule compliance, and budget control.

- Managed a number of underground storage tank evaluation projects, including oversight of tank removal and monitoring well installation, soil and ground-water sampling, and data quality activities.

Wetland and Environmental Impact Studies:

- Coordinated environmental assessment of impacted wetlands in northern New Jersey, including baseline ecological evaluation, literature review, and negotiations with state agency.

- Managed and directed scientists performing wetlands investigations, environmental impact studies, New Jersey Pinelands assessments, permit applications, and soils feasibility studies in Mid-Atlantic states.

- Managed preparation of wetland general permit and transition area waiver applications for clients from industry, land development, and municipalities.

- Designed wetlands restoration plans and assessed extent of historically filled wetlands.

Analytical Quality Assurance/Quality Control:

- Performed data validation for organic and inorganic samples from USEPA Superfund and RCRA sites.

- Provided technical assistance for non-routine sampling and analytical procedures, such as air toxics.

- Audited Contract Laboratory Program (CLP) laboratories for the USEPA Region IX office.

ROUX

Professional Profile

Joseph T. Clifford, P.E.
Senior Engineer

Technical Specialties:

Investigation and assessment of ground-water and soil contamination problems. Design and construction of ground-water extraction and treatment systems. Surface-water, ground-water and air dispersion modeling.

Experience Summary:

8 years of experience: Senior Engineering at Roux Associates, Project Supervisor at Canonie Environmental, Environmental Engineering Consultant for Pennsylvania Power & Light; GS-12 Civil Engineer at U.S. Army Corps of Engineers. Managed investigative and remediation activities at sites under USEPA, NJDEPE, NYSDEC and PADER jurisdiction. Projects included ground-water treatment system design, construction and operation, remedial investigations, feasibility studies, facility closure, and ground-water modeling.

Credentials:

M.S. Civil Engineering, Lehigh University, 1989
B.S. Civil Engineering, Lehigh University, 1984
Professional Engineer, State of Pennsylvania

Professional Affiliations:

American Society of Civil Engineers
National Water Well Association

Key Projects:

- Managed ground-water extraction and treatment system design, construction, and operation for an aquifer impacted by solvents from a semiconductor manufacturing facility. System included 1000 feet of interceptor trenches, 4 sumps, carbon treatment and a fully automated remote monitoring and control unit.
- Managed ground-water extraction and separate-phase product recovery system design for an acid-impacted aquifer system.
- Managed pilot scale in-situ soil vacuum extraction studies to determine design parameters and overall feasibility for full-scale application at several sites impacted with either petroleum hydrocarbons or chlorinated solvents.
- Provided design specifications and prepared NJDEPE air permit applications for catalytic oxidation treatment for remediation of petroleum hydrocarbons at two sites.
- Developed and implemented programs for UST removal, facility closure, soil investigation, and plume definition. Led NPDES permit negotiations for an NYSDEC manufacturing site.
- Provided ground-water extraction and reinjection well designs for an 80 gpm treatment system at a CERCLA site. Three-dimensional ground-water modeling was used to support the design.
- Assisted in the design of a ground-water extraction system to dewater a site enclosed by a slurry wall in EPA Region II.
- Assisted in RI/FS preparation for a landfill in EPA Region III. Project included extensive fate and transport modeling.
- Supervised and developed work plans for several Remedial Investigations, Designs, and Actions under CERCLA. Also supervised Remedial Investigations and Facility Closures under NJDEPE and NYSDEC requirements.
- Conducted several aquifer testing programs to characterize both pumping and infiltration parameters.
- Coordinated and implemented a waste (fly ash) sampling program for a consortium of Pennsylvania utilities.
- Provided quality assurance/quality control for a channel realignment project in New York.
- Provided technical review in civil engineering discipline on plans and specifications for numerous military construction projects in Europe.
- Lead engineer in the design of a $1M jetty and beach renourishment project in Georgia.
- Performed air dispersion modeling to assess pilot study and full-scale impacts of various landfill gas treatment technologies for a CERCLA site in EPA Region I.

Joseph D. Duminuco
Senior Hydrogeologist

Technical Specialties:
Investigation and remediation of ground-water and soil contamination at industrial and municipal sites, and UST investigations.

Experience Summary:
7 years of experience: Senior and Project Hydrogeologist at Roux Associates, Staff Hydrogeologist at Geraghty & Miller and Geologist at Mueser Rutledge Consulting Engineers.

Credentials:
M.S. in Geology, Wright State University, 1990
B.S. in Geology, Hofstra University, 1983
Registered Professional Geologist: Arkansas
NJDEP UST Certification Program

Professional Affiliations:
Association of Ground Water Scientists and Engineers (NGWA)

Key Projects:

- Managed a large-scale, multi-phased RI/FS at a PCB and diesel fuel contaminated railroad yard in New York City. Prepared work plans, coordinated activities at an active railyard, supervised on-site and off-site subsurface investigations, prepared RI report for NYSDEC, participated in public meetings, assisted in design of interim remedial measures to mitigate diesel fuel contamination and prepared and implemented a work plan for the abandonment of an on-site UST.

- Directed all investigative and remedial work performed for a major oil company. Responsibilities included coordination of monitoring and sampling; client, regulator and site owner contacts; technical aspects of all projects; budgets, billing and invoicing of all projects; and strategy evaluation with client.

- Reviewed and evaluated investigative and remedial programs conducted at an industrial site on Long Island. Responsibilities included preparing evaluation report and recommendations for submittal to the Suffolk County Department of Health Services as part of litigation support proceedings.

- Managed site assessments and subsurface investigations, at several service stations and terminals in New York and New England, for a major oil company during divestiture and litigation.

- Researched and evaluated a product recovery operation at a diesel fuel contaminated site on Long Island, New York.

- Managed the continuing operation and maintenance of remediation systems at two gasoline service stations which included a groundwater pump and treat, a product recovery, and soil venting system.

- Negotiated closure with the CTDEP at a gasoline service station where soil venting had been performed, including managing site closure activities and preparing a report for the CTDEP.

- Managed sensitive receptor surveys of seven gasoline service station sites in New York City and Long Island for a major oil company.

- Managed the subsurface evaluation of a shorefront facility on Long Island with a former UST for a major oil company.

- Managed several UST investigations at private residences and prepared reports for an insurance company to assist in their determination of environmental claims, also reviewed and provided recommendations on work plans submitted to the insurance company by environmental contractors.

- Performed a subsurface investigation at a commercial site in New Jersey with former leaking underground storage tanks that included monitoring well installations in bedrock terrain, ground-water sampling, aquifer testing, product bail test/thickness determinations and preparation of a report in accordance with NJDEP - Bureau of Underground Storage Tanks regulations.

- Supervised drilling, installation and development of 33 monitoring wells up to 500 feet deep for an RI/FS at a landfill Superfund site on Long Island, New York. Coordinated sampling for over 60 on-site wells. Generated and interpreted gamma, resistivity and spontaneous potential geophysical logs to determine subsurface geology and ground-water quality.

- Supervised subsurface investigations at gasoline service stations with former leaking underground storage tanks, that included monitoring well installations, soil borings, soil and ground-water sampling and assisted in report preparation for sites in New York, New Jersey and Vermont.

- Supervised drilling, installation and sampling of soil borings and monitoring wells at a PCB contaminated industrial site in Massachusetts. Collected sediment samples from on-site river and ponds.

ROUX

Professional Profile

Walter H. Eifert
Senior Hydrologist

Technical Specialties:
Design and implementation of constructed wetland treatment systems. Watershed planning and management. Surface water hydrologic investigations. Lake and stream remediation. Storm Water permitting and management.

Experience Summary:
11 years of experience: Senior Hydrologist at Roux Associates; Senior Scientist/Project Manager at BBI Environmental; Senior Scientist/Manager of Water Quality at York Services Corporation; Water Resources Planner/Project Manager at E. A. Hickok and Associates; and Research Associate at the Wyoming Water Research Center, University of Wyoming.

Credentials:
M.S. Water Resources Management, 1982
B.S. Wildlife Management, 1980

Professional Affiliations:
American Water Resources Association
Society of Wetland Scientists
Water Environment Federation
American Water Works Association
Gamma Sigma Delta, Agricultural Honorary
Sigma Xi, Research Honorary

Key Projects:

- Project Manager for the design of a constructed wetlands system to treat landfill leachate at the Nicholas County Sanitary Landfill in Summersville, WV. The project included characterization and analysis of the leachate waste stream, system design, permitting and regulatory liaison. The facility is presently under construction with completion scheduled for late May, 1993.

- Project Manager for preliminary design of a constructed wetlands treatment system to remove heavy metals at a large Superfund site in northern Idaho. The design included passive collection and treatment for an 8 cfs metals-laden waste water stream. Target metals included zinc, lead, cadmium, iron and arsenic. The constructed wetlands alternative was recently approved for use in the ROD for the site.

- Project Manager for the design, permitting and construction of two municipal waste water treatment systems using constructed wetlands treatment technologies. The systems included a 3000 GPD secondary facility located in Jefferson County, WV, and a 20,000 GPD facility found in nearby Berkeley County, WV. The systems have been in operation since 1990 and 1992, respectively, and are operating in conformance with established NPDES discharge limitations.

- Managed a site assessment and remedial investigation of contaminated soils at a pipe threading facility in western Pennsylvania.

- Designed, implemented and managed an investigation to mitigate oil and grease loadings from a large industrial site near Charleston, WV. Tasks included completion of storm water simulation analysis, dye tracer studies, contaminate source isolation, effluent chemical characterization and loading analysis, development of routing alternatives and identification of viable remedial measures.

- Project Manager for review and critique of the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (1989 Edition). The project was completed for the American Mining Congress, Washington, D.C.

- Coordinated completion of several jurisdictional wetlands studies in the States of NY, WI, MN and WV.

- Project Manager for the Living Lakes Program, a six-year, multi-million dollar project to develop and demonstrate cost-effective technologies for the neutralization of acidic surface waters and the restoration of important fisheries. The project included the liming of 39 lakes and 13 streams in the northeastern, mid-atlantic and upper mid-west regions of the US. Results were used to develop guideline criteria for lake and stream neutralization projects.

- Completed a physical, chemical and biological assessment of 63 miles of streams within the Monongahela National Forest, WV.

- Managed numerous hydrologic and water quality simulation analyses in the states of MN, WV, WY, ID, NY and MA. Software applications included HEC-1, HEC-2, TR-20, TR-55, QUAL II and WSP-2.

- Project Manager for the preparation of a detailed watershed management plan for the Minnehaha Creek Watershed District, Minneapolis, MN. Tasks included completion of a comprehensive physical, chemical and biological inventory of the 183 square mile watershed, computer simulation analyses of the hydrologic and water quality response under a variety of design storm conditions, and the development of a capital improvements program and implementation schedule.

- Project Manager for seven EPA Clean Lakes projects in MN and WV. Included were five Phase I studies designed to diagnose water quality problems and identify remedial alternatives, and two Phase II projects involving implementation of the selected alternatives.

- Principal Investigator for evaluating the natural resources of Yellowstone National Park and Big Canyon National Recreation Area, WY. The studies resulted in the generation of two computerized bibliographic data bases containing over 18,000 citations. The studies were completed under contract to the National Park Service.

ROUX

Professional Profile

Karen A. Fay, P.E.
Senior Engineer

Technical Specialties:
Ground-water and soil investigation and remediation, environmental site assessments, and waste control management.

Experience Summary:
7 years of experience: Senior Environmental Engineer at Roux Associates, Wastewater Senior Staff Engineer at Metcalf & Eddy, and Staff Engineer at Hancock Survey Associates. Managed and participated in soil, groundwater and wastewater treatment system designs, sanitary and stormwater sewer designs, RI/FS studies, cost evaluations for environmental remediation projects, and ground-water monitoring programs.

Credentials:
B.S. Civil Engineering, University of New Hampshire, 1985
Professional Engineer (NY, MA)

Professional Affiliations:
National Society of Professional Engineers
Water Environment Federation
New York Water Pollution Control Association
New Jersey Water Pollution Control Association
Hazardous Waste Committee

Key Projects:

- Project Manager for the design of an industrial stormwater conveyance system and retention basin to meet NPDES permitting requirements at an aluminum facility in West Virginia.
- Senior Engineer for design of a petroleum hydrocarbon recovery and ground-water treatment facility for a multi-million gallon separate-phase petroleum spill in Brooklyn, New York. The project included the design of separate-phase petroleum recovery system, ground-water force main system, and ground-water treatment facility. Ground water was treated by an air stripping technology and air emissions were controlled by a catalytic oxidation unit.
- Senior Engineer for filing of federal, state and city permits related to construction of separate-phase petroleum recovery system, force main system, and ground-water treatment facility in Brooklyn, New York.
- Project Manager for the design of a system to remediate soil and sediment at a former metals refining facility in Upstate New York. Responsibilities also include management of future construction activities at site.
- Project Manager for feasibility study to remediate soil and sediment at a former metals refining facility in upstate New York. Responsible for completion of remedial investigation and feasibility study final reports submitted to the state.
- Senior Engineer for the investigation and remediation of PCBs being mobilized off site through a stormwater system at a railroad yard in New York City.
- Senior Engineer for the preliminary evaluation of in-situ solidification technology applications to treat PCBs in soil at a railroad yard in New York City.
- Senior Engineer for completion of an expert report for a New Jersey law firm. The report considered a potentially responsible party's involvement in the disposal of manufactured waste at a Superfund landfill site in New Jersey.
- Senior Engineer for evaluation of remedial alternatives and costs to remediate ten manufactured gas plant sites.
- Senior Engineer for evaluation of costs, and the identification of alternative costs to remediate a USEPA Superfund landfill site in Upstate New York.
- Field Supervisor for infiltration/inflow investigation of a 24-mile sewer collection system in Scituate, Massachusetts. Investigation included oversight of flow metering and observation well programs, and inspection of sixty manholes.
- Managed, designed and inspected construction of over seventy-five subsurface sewage disposal systems for residential and commercial developments in fifteen Massachusetts towns. Designs included gravity and pumped systems.
- Senior Staff Engineer for preparation of a draft infiltration/inflow analysis report for town of Scituate, Massachusetts.
- Senior Staff Engineer for supplemental facilities plan to modify and expand a 1.0 mgd secondary wastewater treatment plant for town of Scituate, Massachusetts.
- Field Engineer for a 3-year ground-water monitoring program and various field sampling programs at two municipal wastewater treatment facilities.
- Negotiated with a state regulatory agency for the closeout of two construction grants for a wastewater treatment plant, resulting in a $750,000 return to the city.
- Assisted in the preparation and completion of operation and maintenance manuals for various wastewater treatment facilities.

ROUX

Professional Profile

Michele Finn Itel, P.E.
Senior Engineer

Technical Specialties:
Project and administrative management of CERCLA RI/FS and design projects. Ground water and soil treatment system design. Scoping of RI/FS and pre-design investigation activities. Site assessments.

Experience Summary:
7 years of experience: Senior Engineer with Roux Associates; Project Supervisor/Project Engineer with Canonie Environmental Services Corporation; Chemical Engineer with Warzyn Engineering; Engineer with Hart Environmental Management Corporation; Engineer with E.I du Pont de Nemours and Company.

Credentials:
M.S. Water Resources and Environmental Engineering, Villanova University, 1992.
B.ChE. Chemical Engineering, Villanova University, 1985.

Professional Affiliations:
American Institute of Chemical Engineers
National Water Well Association

Registrations:
Professional Engineer, State of Pennsylvania

Key Projects:

- Project Engineer for pre-design investigation and design of a slurry wall and ground water extraction, treatment, and reinjection/reinfiltration system for remediation of solvents at a Superfund Site in Central New Jersey. Treatment system components included inorganics dispersion, air stripping and activated carbon adsorption.

- Project Engineer involved in coordinating and performing treatability studies for removal of volatile and semi-volatile compounds in ground water for a Superfund Site in New Jersey. Treatability studies performed included UV light/chemical oxidation, biological degradation, air stripping and activated carbon adsorption.

- Negotiated risk-based clean-up goals for a Superfund Site with EPA, resulting in approximately $1,500,000 savings in treatment system costs.

- Project supervision for thermal portion of a corrective measures study for a major chemical company in Northern New Jersey.

- Project Supervisor responsible for the procurement of two air stripping/activated carbon treatment systems for a Superfund site in North Carolina.

- Performed reduction of chemical and hydrogeological data and prepared RI/FS reports for a Superfund Site in Western Pennsylvania.

- Prepared Treatment Technology Scoping Report to address the containment/treatment of mine tailings and impacted surface waters, sediments, and ground water for a Superfund Site in Montana. Provided technical guidance for the conduction of a flocculation treatability study for surface waters.

- Assisted in the preparation of FS reports for six Superfund Sites in Michigan, Illinois and Indiana. Performed technology screening, evaluation and costing as well as ARARs analyses.

- Coordinated RI activities at three Superfund Sites in the state of Michigan.

- Performed environmental compliance and liability audits of 50+ industrial and commercial facilities.

- Assisted in the design and configuration of a distributed control system of a high-level radioactive waste vitrification facility at a DOE Site in South Carolina. Provided process design for the off-gas system of the vitrification melter system.

- Provided construction management for the removal of several underground petroleum storage tanks in Michigan. Created database to prioritize removal of tanks for a world-wide manufacturer of health-care products.

- Designed and prepared bid specifications for an inorganics coagulation, flocculation and sedimentation process for a Superfund site in Oklahoma.

ROUX

Professional Profile

Peter J. Gerbasi, P.E.
Principal Engineer

Technical Specialties:
Remedial design and construction management. Feasibility studies for remediation of soil and ground-water. Remedial designs include air sparging; air stripping; biological, physical and chemical treatment; soil vapor extraction and thermal oxidation. Air, ground water and facility permitting.

Experience Summary:
8 years of experience: Principal Engineer with Roux Associates; and Lead Project Engineer at Camp Dresser and Mckee.

Credentials:
B.E., Civil Engineering, Manhattan College, 1985.
M.E., Environmental Engineering, Manhattan College, 1989.
Professional Engineer, State of New York, 1993.

Professional Affiliations:
New York Water Pollution Control Association, Kenneth Allen Memorial Award Co-recipient (1988) and member of the Industrial and Hazardous Waste Committee.
Long Island Association, Environmental Committee.
Water Environment Federation.
Sigma Xi, Scientific Research Honor Society.

Papers and Presentations:
Major Gasoline Spill Remediation Requires Integrated Approach - Coauthored paper presented at the Water Environment Federation's 65th Annual Conference and Exposition, 1992.
Biological Treatment of Petroleum Hydrocarbons - Coauthored paper presented at NWWA/API Petroleum Hydrocarbons and Organic Chemicals in Groundwater Conference, 1991.
Biological Treatment of Gasoline Contaminated Groundwater - Coauthored paper presented at the NWWA/API Petroleum Hydrocarbons and Organic Chemicals in Groundwater Conference, 1991.
Gasoline Contaminated Groundwater Treatment Study - Coauthored paper presented at the 47th Annual Purdue University Industrial Waste Conference, 1992.
Field Testing of Fine Bubble Aeration Systems; Ridgewood, A Case Study - Presented at the 58th Annual Meeting of the New York Water Pollution Control Association, 1986.
Using Leaching Tests to Estimate VOC Availability for Transport in Ground Water - Presented at the 60th Annual Meeting of the New York Water Pollution Control Association, 1988.

Key Projects:
- Lead Project Engineer for the RI/FS, design, and implementation of remedial action projects at hazardous waste sites. Responsibilities included: planning and coordinating on-site investigative activities and health & safety plans; developing, evaluating and reviewing remedial alternatives and providing detailed cost estimates; preparing plans and specifications; and providing operations and maintenance services for the implementation of remedial action.

- Lead Design Engineer for the remediation of a 1-million gallon gasoline spill at the Long Island terminal of a large petrochemical distributor. Responsible for the design of a 1.5-mgd ground-water treatment facility, performing pilot studies for the treatment of metals and volatile organic compounds, and preparing design report. Also responsible for coordinating, performing, and directing the design of processes for biological treatment for removal of VOCs (primarily BTEX), metals precipitation for the removal of iron and manganese, air stripping with vapor phase carbon treatment for the final polishing and removal of VOCs, mixed media filtration, and ion exchange.

- Senior Project Engineer responsible for the design, construction, and operation of a 75 gpm interim remedial measure (IRM) treatment facility which included oil/water separation, chemical injection for pH control, packed tower air stripping, vapor phase carbon adsorption and ground water recharge. Responsible for performing site inspection and administration activities for this $2.5 million construction project.

- Senior Manager and Lead Project Engineer responsible for the implementation and operation of a soil vapor extraction pilot study, and subsequent design of a vapor extraction and treatment facility at an east coast petroleum distribution terminal. Responsibilities included: performing civil and site design and construction services for the 2,000-scfm vapor extraction and treatment facility; designing a continuous emissions monitoring system and quality assurance plan; preparing air emissions permits and mass emissions estimates; and overseeing air modeling efforts.

- Lead Project Engineer responsible for design team implementing a Discharge Prevention and Containment Compliance (DPCC) program at an industrial facility. Performed mechanical process design of a 25 gpm industrial stormwater treatment facility. Processes included influent heating, oil/water separation, direct filtration and liquid phase carbon adsorption.

- Project Manager for all Phase I environmental site assessments preformed for a Long Island bank. Evaluated commercial and industrial properties in preparation for property transfer and made recommendations for further investigative and corrective action activities.

- Principal Design Engineer for the preliminary design of a ground water recharge system as part of the Suffolk County Flow Augmentation Needs Study in New York.

- Engineer for a site utilities study conducted at a national laboratory on Long Island. Assisted in the evaluation of existing wastewater treatment facilities and performed a comprehensive evaluation and computer analyses of the water treatment and distribution system resulting in recommendations for wastewater treatment facility upgrades, water main replacement and water treatment system upgrades.

- Engineer for a U.S. Army Corps of Engineers remediation and construction project in New Jersey. Responsibilities included: predesign site surveys, geotechnical investigations, ground water treatability studies to determine extent of heavy metal and VOC contamination; design of the excavation and removal of contaminated soil; and performance of construction management services during site remediation.

Robert L. Hall, Ph.D.
Senior Geochemist

Technical Specialties:
Ground-water chemistry. Regulatory compliance. Environmental site assessments. Environmental impacts of toxic chemicals.

Experience Summary:
14 years of experience: Geochemist at Roux Associates and two other consulting firms; Environmental Scientist and Assistant Branch Chief at USEPA, Office of Pesticide Programs (Washington) and the Region II (New York) Office; Analyzed and modeled transport of ground-water contaminants at hazardous waste sites. Directed monitoring of pesticides in surface water and ground water. Assisted attorneys with environmental litigation. Implemented federal Underground Storage Tank regulations. Contributed to policy on pesticide disposal.

Credentials:
Ph.D. Biochemistry, University of Chicago.
B.A. Chemistry, Swarthmore College.

USEPA MINTEQA2 Workshop on Metals Speciation Modeling.
American Chemical Society Short Course: Toxicology - Principles and Practices.
Principles of Hydrogeology, graduate course, Adelphi University.

Professional Affiliations:
American Chemical Society
Assoc. of Ground-Water Scientists and Engineers

Key Projects:
- Evaluated data on the timing and extent of soil contamination by solvents at a midwestern Superfund site, in support of litigation.
- Analyzed data on releases of pharmaceutical manufacturing wastes at a New Jersey site, in support of litigation. Provided expert's report.
- Analyzed historical references on coal tar chemistry to determine state of knowledge at a specified time in the past, in support of litigation. Provided expert's report.
- Summarized properties and migration potential of chemicals of concern, including chlorinated solvents and PCBs, at a California industrial site, in support of litigation.
- Identified historical ground-water regulations applicable to a New Jersey industrial site, in support of litigation.
- Advised attorneys on the migration potential of PCBs in mineral oil at a transformer disposal site in Florida, in support of litigation.
- Reviewed soil analysis data for PCBs at a transformer disposal site in Maryland, in support of litigation. Provided expert opinion on sources and migration potential of PCBs.
- Designed and managed the concurrent analysis of water samples during an aquifer pumping test at a Massachusetts Superfund site (#5 on NPL).
- Supervised USEPA staff implementing federal Underground Storage Tank regulations in New York, New Jersey, Puerto Rico, and the Virgin Islands.
- Participated in USEPA's selection of disposal method for dioxin-containing pesticides. Contributed to RCRA permit modification and delisting petition for the USEPA mobile dioxin incinerator. Managed transportation and interim storage of pesticide wastes. Contributed to USEPA policy decisions on pesticide disposal.
- Performed preliminary ground-water modeling studies and exposure assessment on the movement of a benzene plume at a Massachusetts Superfund site.
- Employed ground-water flow modeling to assess the migration of an EDC/VCM/TCE plume at a Delaware City, Delaware, Superfund site, and a chlorinated solvent plume at a Long Island industrial site.
- Managed a ground-water and surface-water data call-in to USEPA on a pesticide product which is under review for re-registration.

ROUX

Professional Profile

Gregory D. Martin, P.G.
Senior Hydrogeologist
Corporate QA/QC Officer

Technical Specialties:
Design and implementation of soil and groundwater investigations. Preliminary design and supervision of remediation projects. Regulatory coordination and negotiations. Interpretation of federal and state regulations.

Experience Summary:
8 years of experience: Staff Geologist, Project Hydrogeologist and Senior Hydrogeologist with Roux Associates, Inc.; Director of Corporate Quality Assurance and Quality Control; New Jersey Office Equipment Manager.

Conducted state-lead investigative and remedial activities under MADEP, NYSDEC, PADER, NJDEPE, and DNREC, among others. Conducted USEPA-lead investigations and activities under the jurisdiction of RCRA, CERCLA, CWA, CAA, TSCA and FIFRA.

Credentials:
B.A. Geology, Colgate University, 1985

Registered Geologist, Tennessee (TN1038); Registered Geologist, Arkansas (1531); NJDEPE UST Certification #G0000037; OSHA Health and Safety Training Course; Principles of Ground-Water, Aquifer Analysis and RCRA Corrective Action Courses.

Professional Affiliations:
National Ground Water Association

Key Projects:

- Managed a large-scale soil, sediment, ground-water and surface-water investigation at a viscose manufacturing facility located in Pennsylvania. All activities were completed in accordance with CLP protocols under the direct supervision of USEPA supervision or their contractors.

- Managed the implementation of environmental investigations at over 60 retail service stations in Connecticut, Rhode Island, Massachusetts, New Jersey, New York, Delaware, Pennsylvania, Maryland and New Hampshire, including project direction, data review, regulatory interaction, and client support. Remediation activities including vapor extraction, pump and treat, and excavation have been conducted at approximately 15 locations.

- Designed and conducted TCLP sampling and analysis plan for four facilities to determine whether RCRA TSDF requirements were applicable.

- Developed an investigation and remediation analysis for a former chromium pigments manufacturing facility in Pennsylvania. Investigative activities are ongoing.

- Coordinated and supervised multiple tank removals, buried drum identifications and segregations, and soil and ground-water investigations at a dismantled paint and pigment manufacturing facility under the jurisdiction of NJDEPE.

- Designed and conducted numerous environmental property transfer site assessments in an effort to identify potential environmental concerns and satisfy buyer's, seller's or lender's information needs.

- Prepared an ECRA Cleanup Plan for submission to NJDEP for a 61 acre bulk oil storage and distribution terminal. The Plan included a passive free-phase recovery system and negotiations of remediation requirements.

- Participated in preparation of RI/FS submission for a listed Superfund site in New York.

- Conducted an electrical earth resistivity survey at a landfill to determine the horizontal and vertical extent of leachate migration.

- Supervised an extensive test pit program to define and map the extent of subsurface disposal at an agricultural chemical processing plant.

- Participated in a 20-state research project to determine hydrogeologic areas which were sensitive to pesticide applications.

- Negotiated regulatory approval of work plan at a RCRA Hazardous Waste Facility undergoing a Post Closure Plan.

- Conducted extensive domestic well sampling program in a five-county area of the Central Sands region of Wisconsin to evaluate the presence and distribution of an agricultural pesticide.

- Supervised the installation of over 100 monitoring wells in varied geologic conditions. Familiar with downhole geophysical logging techniques and associated data reduction. Supervised packer testing at several locations and conducted data interpretation for evaluation of contaminant distribution in fractured bedrock settings.

Martha M. Smith
Senior Hydrogeologist

Technical Specialties:
Coordination and organization of RI/FS investigations. Environmental database management for Superfund and other hazardous waste projects.

Experience Summary:
11 years of experience: Geologist at Geraghty & Miller; Geophysical Technician at Amoco Production Company; Earthquake Seismologist at Fiji Mineral Resources Department; and Field Investigator on multi-disciplinary acid rain project.

Credentials:
B.A. Geology, Smith College, 1979.

Professional Affiliations:
National Water Well Association
American Geophysical Union

Key Projects:

- Prepared work plan and managed a large-scale RI/FS at a Superfund site in Massachusetts ranked #5 on the NPL. The investigation included addressing areas of concern, such as 'hot spots' containing chemical wastes (hidepiles) left from past manufacturing operations; analyzing soil, ground water, surface water and stream sediment; evaluating surface water/ground water and multiple aquifer relationships. Responsibilities included managing and supervising field work, scheduling, budget and invoice preparation and presenting investigation results to the client and regulatory agencies.

- Site Manager for a RI/FS at an active manufacturing facility in western Pennsylvania with an on-site, inactive landfill containing heavy metals and solvents. Responsibilities included preparing work plans and reports for Phase 1 and Phase 2 investigations, managing all field work, budget preparation and invoice review.

- Field Manager for a ground-water and surface-water investigation at a large Superfund site in Colorado. Organized and performed major field sampling programs. Performed geophysical and subsequent subsurface investigation.

- Supervised drilling, installation and development of monitoring wells and water-quality borings for an RI/FS at a former petroleum and chemical storage facility in Nassau County, New York.

- Field Manager for an environmental investigation at a highway department facility. Investigated ground-water impacts from salt and petroleum constituents and geophysical survey to determine locations of buried drums.

- Supervised drilling, installation, and sampling of soil borings and monitoring wells at an Army facility contaminated with pesticide and chemical agents. Extensive investigative work following Level B and C Health and Safety protocols.

- Developed an index system for documents pertaining to environmental litigation at a Superfund Site in New Jersey.

- Co-developed a water-quality and soil-quality computer database containing 100,000+ analytical records.

- Organized and led seismic surveys in preparation for the establishment of permanent seismic monitoring stations in the Fiji Islands.

- Assisted with surface mapping around several lake basins as part of an acid rain study in the Adirondack region of New York.

ROUX

Professional Profile

Robert D. Strode, CIH
Senior Scientist

Technical Specialties:
Health & Safety, and Industrial Hygiene services and project management for residential, industrial and hazardous waste sites. Specification and validation of field and laboratory analytical methods. Quality assurance/quality control plans and programs.

Experience Summary:
11 years of experience in chemistry and industrial hygiene: Senior Scientist for Roux Associates; Senior Industrial Hygienist for Chemistry & Industrial Hygiene; Senior Inorganic Chemist with C.C. Johnson and Malhotra; Laboratory Manager for CSMRI Analytica; Laboratory Analyst/Supervisor at Fred C. Hart Associates; Chemistry Technician with Skyline Labs.

Credentials:
M.S. Microbiology, Colorado State University, 1985.
B.S. Microbiology, Colorado State University, 1977.

Professional Affiliations:
American Chemical Society.
American Industrial Hygiene Association.

Certifications:
American Board of Industrial Hygiene:
Certified Industrial Hygienist, Comprehensive Practice.

Key Projects:

- Site Supervisor for industrial hygiene/health & safety during remedial activities involving neutralized isopropyl methanefluorophosphonate (GB) salts at the Rocky Mountain Arsenal. Performed daily air monitoring and supervision of contractor and subcontractor personnel.
- Managed operations and performed heavy metals analyses at an on-site field laboratory to determine nature and extent of contamination at the Forest Waste Superfund site in Otisville, Michigan.
- Litigation support performing reconstructed exposure assessments and risk assessments for 2,3,7,8-dioxin exposures at a former 2,4,5-T manufacturing plant (Superfund site) in Jacksonville, Arkansas.
- Developed risk assessment based decision criteria for selection of remedial alternatives related to treatment, transportation and disposal of Basin F liquids at the Rocky Mountain Arsenal.
- Coordinated and trained health & safety professionals in general industrial hygiene and air sampling techniques and for compliance with OSHA 1910.120 (hazardous waste), OSHA 1910.1001 and 1926.58 and EPA 40CFR 763 (asbestos), and HUD lead abatement.
- Managed, designed and performed numerous indoor air quality investigations for school districts in the Denver, CO area. Investigated chemical, biological and physical agents utilizing state of the art instrumentation and methods. Provided consulting services including meeting with parents, teachers and other concerned citizens groups.
- Developed standard operating procedures for EPA contract laboratory program (CLP) inorganic data validation and managed the CLP RAS and SAS inorganic data validation group for CCJM.
- Designed special analytical services (SAS) protocols for inorganic analyses of mining wastes in connection with RI/FS activities at the Butte, MT NPL Site and other NPL sites in Colorado, Utah, and Wyoming.
- Co-author of the EPA CLP SAS "Inorganic High Concentration Waste Analysis" protocol (SOW 285) used for analysis of high concentration hazardous waste samples under Superfund.
- Developed standard operating procedures for handling organic and inorganic hazardous wastes generated by the EPA NEIC Regulated Substance Laboratory in Denver, Colorado. SOPs addressed waste minimization, disposal, packaging and labeling in compliance with RCRA, DOT and other regulations.
- Performed environmental assessments/transition audits for retail, residential, and industrial properties, including Phase I and Phase II investigations and reporting.

ROUX

Professional Profile

Paul Supple
Senior Hydrogeologist

Technical Specialties:
Ground water/soil contamination investigations.

Experience Summary:
7 years of experience: Managed and participated in over 100 ground water and soil contamination projects, including organic solvent, pesticide, PCB and hydrocarbon investigations. Participated in investigations at several Superfund-listed sites.

Credentials:
B.S. Geology, University of Massachusetts at Amherst, 1985.

Professional Affiliations:
National Water Well Association.

Key Projects:

- Conducted and managed investigations of ground water and soil contamination from underground storage tanks in California.
- Supervised the removal and clean up of leaking underground storage tanks and contaminated soils in California.
- Supervised the installation and sampling of monitoring wells to track an organic solvent plume to the source area at a Superfund site in New England.
- Determined sensitive hydrogeologic areas in Florida, California, West Virginia, Illinois, Michigan and Delaware for application of herbicides. Supervised a soil boring and monitoring well installation program in permeable soils of these states to determine the ability of selected herbicides to leach to ground water.
- Conducted detailed hydrogeologic investigations at former pesticide formulating plants in New England and California. Evaluated remedial alternatives, such as free product recovery, soil venting and in-situ bioreclamation.
- Participated in a surface water monitoring program for two agricultural chemicals at 25 sites around the country.
- Supervised the installation and sampling of monitoring wells at chemical plants and manufacturing facilities in New York, New Jersey, Connecticut and Massachusetts.
- Participated in several pump tests to determine aquifer coefficients.
- Supervised the installation of piezometers and monitoring wells at a manufacturing plant in Kentucky and at a railroad yard in Connecticut. Diesel fuel impacted the soil and ground water. Screened and evaluated appropriate remedial technologies.
- Assisted in an electrical resistivity survey of a four square mile area to determine the source and extent of an organic compound plume at a Superfund-listed site in Delaware.
- Assisted in the collection of over 1,000 soil samples from test pits and borings as part of a subsurface investigation at a 300 acre Superfund-listed site.

ROUX

Professional Profile

Mark Tucker, P.G.
Senior Hydrogeologist

Technical Specialties:
Environmental site assessments, hydrogeologic and geophysical investigations, and regulatory compliance.

Experience Summary:
8 years experience: Senior Hydrogeologist at Roux Associates, Inc.; Regional Hydrogeologist at Chemical Waste Management; and Senior Geoscientist at ICF Technology. Managed subsurface investigations for industrial clients, RCRA hazardous waste treatment, storage, and disposal facilities, and CERCLA hazardous waste sites. UST management, property transfer assessments, and ground-water monitoring, RCRA facility investigations, SPCC inspections, NPDES monitoring, and emergency response.

Credentials:
M.S., Geology, University of Pittsburgh, 1983
B.S., Geoscience and Biology, Indiana University of Pennsylvania, 1980

Professional Affiliations:
Delaware Registered Professional Geologist (No. 519)
Geological Association of New Jersey
National Ground Water Association

Publications and Presentations:
Geological interpretation of magnetic anomalies in the Sugarloaf Mountain area, Maryland.

Key Projects:
- Provided underground storage tank management services at over 20 facilities in New Jersey for a major water supply company. Services included tank decommissioning, soil investigations, and ground-water investigations.
- Managed a hydrogeologic investigation at a solvent recycling facility in Ohio to determine the extent of contamination due to spills and past waste handling practices. Designed a ground-water remediation system consisting of interceptor trenches and extraction wells to prevent migration of contaminants to the area's sole source aquifer.
- Managed a project to provide water-treatment systems for 31 contaminated drinking water wells in a Maryland community. Treatment included carbon filtration and air stripping units.
- Conducted magnetic and soil-gas surveys at a chemical manufacturing facility in Virginia to determine the location, extent, and estimated number of buried drums. Soil-gas surveys were used to characterize drum contents without excavation. Oversaw the subsequent excavation of approximately 1,400 drums.
- Conducted a hydrogeologic investigation at an abandoned hazardous waste site in Maryland to determine potential threats to nearby drinking water wells. Complex geologic conditions required a combination of soil auguring, air-rotary, and mud-rotary drilling techniques.
- Managed an investigation of a PCB-contaminated railyard in southeastern Pennsylvania which included an extensive soil sampling program to delineate contamination in nearby residential areas. Directed a project team who designed and installed runoff control structures which included drainage swales, berms, and sedimentation basins.
- Conducted an investigation to determine the extent of contamination associated with illegal disposal of liquid hazardous waste into a deep coal mine.
- Managed ground-water monitoring programs for a major hazardous waste disposal firm. Participated in agency negotiations related to RCRA operating permits and RCRA corrective actions.
- Conducted geologic hazard assessments at 27 abandoned mine sites in Pennsylvania. Investigations included delineation of subsidence-prone areas, mapping sources of acid mine drainage, and locating open shafts and portals.
- Managed hydrogeologic investigations for a water supply development project which included aquifer test analysis and assessment of saltwater intrusion.
- Managed a soil-venting program to remediate gasoline-contaminated soils at a site in Delaware. The project included soil-gas surveys and a pilot venting program prior to installation of a full-scale, soil-venting system.

ROUX

Professional Profile

Linda M. Wilson
Senior Scientist/Regulatory Specialist

Technical Specialties:

Regulatory Compliance Specialist; Quality Assurance Manager; Health & Safety Coordinator; Good Laboratory Practices Auditor; experienced in industrial hygiene & asbestos abatement programs.

Experience Summary:

7.5 years of experience: Senior and Project Scientist with Roux Associates; Senior Environmental Scientist with TRC Environmental Consultants; Operations Manager with Hygienetics.

Credentials:

M.S. Toxicology, St. John's University (1982)
B.S. Environmental Science, Cornell University (1978)

Certifications:

NIOSH 582 Airborne Asbestos Sampling and Evaluation Techniques

Key Projects:

- Prepared Field Sampling Plans, Quality Assurance Project Plans, and Health & Safety Plans for numerous Remedial Investigation work plans.
- Evaluated and validated analytical water and soil data from industrial and Superfund sites.
- Developed Applicable or Relevant and Appropriate Requirements (ARARS) for sites in Pennsylvania and North Carolina.
- Assisted in the development of Remedial Investigation and Feasibility Study reports for a Superfund site in New York.
- Provided regulatory assistance to clients for RCRA, SARA, FIFRA, and TSCA compliance issues.
- Prepared data usability reports for NYSDEC to support the use of laboratory results for two New York sites.
- Developed environmental compliance modules to define the regulatory responsibility for a pesticide manufacturing firm.
- Edited pesticide surface-water and ground- water sampling reports following EPA GLP standards.
- Health & Safety Coordinator responsible for the development of health and safety plans, medical monitoring, and OSHA training of technical staff.
- Conducted audits for compliance with Good Laboratory Practice (GLP) standards for US EPA, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and Toxic Substance Control Act (TSCA).
- Developed technical support and regulatory documentation for attorneys preparing for environmental litigation.
- Project Manager responsible for quality assurance for asbestos investigations within 800 NYC Transit Authority facilities.
- Conducted in-house training seminars on NYC Public Law 76/85 and NYS Industrial Code 56.
- Performed research to update Material Safety Data Sheets to ensure compliance with OSHA regulations for an industrial client.
- Conducted tenant awareness meetings sponsored by real estate management agents. Meetings answered tenant's questions and concerns regarding asbestos removal in their building.
- Implemented operations and maintenance programs for high-rise buildings in NYC, in response to Public Law 76/85.

ROUX

Professional Profile

Joanne Yeary
Senior Hydrogeologist

Technical Specialties:
Ground-water/surface-water investigation of hazardous materials and agricultural chemical residues in the environment.

Experience Summary:
5 years of experience: Senior Hydrogeologist and Geologist with Roux Associates. Supervised several ground-water, soil and surface-water sampling programs. Assisted in ground-water modeling projects and aquifer test analysis.

Credentials:
B.S. Geology, S.U.N.Y.Stony Brook, 1986.

Professional Affiliations:
National Ground Water Association

Key Projects:

- Supervised well installations, ground-water sampling, soil sampling and surface-water sampling at a CERCLA hazardous waste site in Massachusetts which is ranked #5 on the NPL.
- Participated in pesticide monitoring studies in ground water, soils, rivers, and streams. Projects included retrospective studies, prospective studies, and detection follow-ups. Evaluated findings of state monitoring programs. Edited sampling reports following EPA Good Laboratory Practice standards.
- Supervised Remedial Investigation at a CERCLA hazardous waste site in New York.
- Installed piezometers and defined extent of a free product plume at a site in New York.
- Supervised soil borings at a site in Massachusetts and defined extent of buried hazardous waste.
- Participated in slug tests at a hazardous waste site as part of a Phase II investigation for the NYSDEC.
- Prepared site status report for a service station in Connecticut.
- Evaluated several hazardous waste sites for potential impact to the environment, calculated HRS scores and prepared Phase I reports for NYSDEC.
- Quality Assurance Officer for several pesticide projects. Assured that data, reports and archives adhere to EPA Good Laboratory Practice standards.
- Managed hydrogeologic investigation at a site in Massachusetts and prepared summary report.
- Wrote site assessment report for a former service station in Massachusetts.
- Wrote Phase II report in accordance with the Massachusetts Contingency Plan for a former service station in Massachusetts.
- Co-wrote ground-water contingency plan for a major bulk petroleum storage facility in New York.
- Logged soil borings and assisted in supervision of well installation at a site in Massachusetts. Developed, purged and sampled wells for organic compounds.
- Assisted in vapor probe installation at a hazardous waste site in New York.
- Conducted pumping test at hazardous waste site in Massachusetts as part of a program to evaluate an in-situ remedial program.
- Assisted in writing summary report of environmental studies at a hazardous waste site in Massachusetts.
- Assisted in analysis of aquifer test data for a site in Delaware, and prepared summary report.
- Analyzed slug test data for three NYSDEC Phase II Investigations on Long Island, and prepared summary report for each.
- Analyzed specific capacity test data for a site in Massachusetts, and prepared letter report describing results.

ATTACHMENT B

STATEMENT OF QUALIFICATIONS
OF
EBASCO ENVIRONMENTAL

5.0 EBASCO EXPERIENCE AND SELECT PROJECT DESCRIPTIONS

5.1 Ebasco Experience

Ebasco is the largest engineering firm in New York State and employs more than 2,000 professionals in the New York metropolitan area alone. Being the eighth largest design, construction and construction management firm in the United States, we employ more than 6,000 professionals nationally offering services in every area of environmental consulting, engineering, design, and construction. As one of a select group of firms with a full-service, in-house complement of regulatory, scientific, technical, analytical, engineering, design, and construction capabilities, Ebasco brings a proven cost-effective ability to meet the rigorous technical and managerial challenges of toxic and hazardous waste remediation projects from initial investigation studies through remedial action/construction and site closure.

During the engineering design phase of major industrial and utility projects, Ebasco's civil and geotechnical engineering groups have been intimately involved in the analysis and design of excavations. In general, water intake and other civil structures designed by Ebasco require deep excavations in soil and rock supported by braced sheet piles, sheet piles with anchors, H piles with lagging, and diaphragm walls with tie backs. Ebasco also has the technical expertise and experience in the design of deep excavations with a high groundwater table often requiring extensive dewatering.

The excavation, segregation, stockpiling, and removal of contaminated soils is an important activity on many remediation projects. Depending on site and groundwater conditions different excavation support systems have been designed and implemented by Ebsaco.

5.2 Project Descriptions

At the end of this section are selected detailed project descriptions of infrastructure, power generating and site remediation projects. Presented below are highlights of Ebasco's relevant construction/remediation projects.

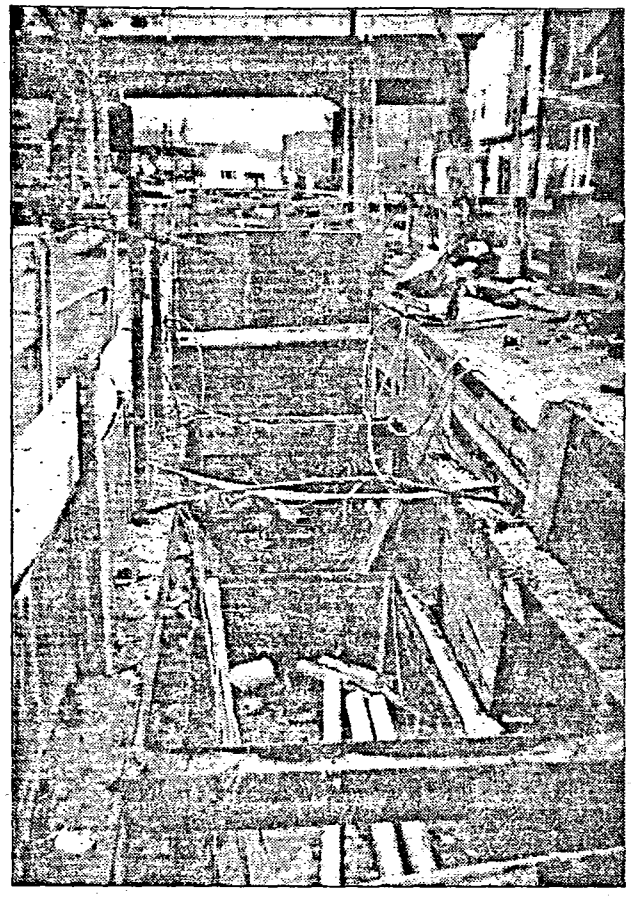
Project	Ebasco's Responsibilities	Construction/Remediation
Construction of storm and sanitary sewers and water mains in 24th Street, Queens, New York City	• Resident Engineering & Inspection Services	• Congested area required traffic controls • Excavation & installation of sewers • Backfill and Site Restoration
Radium Chemical Company Site Queens, New York City	• Pre-remediation engineering • Engineering support during remediation & post remediation	• Decontamination & Demolition • Transportation & Disposal of Debris and Contaminated Soils • Site Restoration

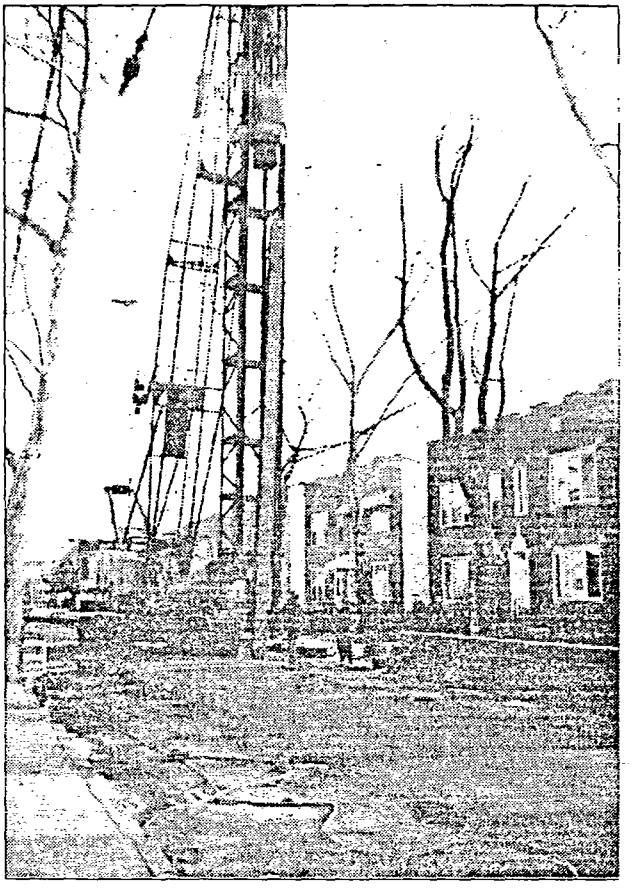
Project	Ebasco's Responsibilities	Construction/Remediation
Battery Park City, New York City	• Design and development of engineering construction documents • Construction oversight (Inspection services)	• Geotechnical investigation • Roadways • Underground utilities including water & sewer mains
Somerset Generating Power Station Somerset, New York	• Complete design engineering and development of engineering construction documents • Construction • Construction & project management	• Deep excavations for installation of circulating water intake structure, pump house & piping • Extremely rigorous schedule and stringent environmental requirements
Berkeley Heights Chemical Plant Site Berkeley Heights, New Jersey (cleanup under Consent Order)	• Pre-design investigations • Pre-remedial design engineering and development of engineering construction	• Installation of groundwater treatment system including bioremediation system • Installation of landfill cap and soil-bentonite slurry trench cutoff wall
Schools I.S. 52 & P.S. 176 Manhattan, New York	• Construction management • Engineering support during construction - Value engineering - Constructibility reviews	• Rehabilitation & modifications to an existing 5-story building • Excavation & removal of contaminated soil • Bearing pile foundations with steel superstructure
Burnt Fly Bog Site Marlboro Township, New Jersey	• Field investigations • Feasibility study • Pre-remediation engineering and development of engineering construction documents • Construction management and engineering support during remediation and post remediation	• Excavation of contaminated soils & sludges • Backfill with clean soil, grading and capping • Managed contracts with prime contractor and sub-contractors

Project	Ebasco's Responsibilities	Construction/Remediation
AlliedSignal Properties Teterboro, New Jersey	• Field Investigation • Pre-remediation engineering • Engineering support during remediation	• Excavation and transportation of radioactively contaminated soils for a NORM facility • Design & installation of sheet piling retaining wall system for excavation support • Removal of four 200,000 gallon underground storage tanks
Hamilton Avenue Marine Transfer Station Brooklyn, New York City	• Construction management and engineering support during remediation • Resident engineering and inspection services	• Installation of a subsurface concrete diaphragm wall • Slurry trench method of excavation using clamshell
Syncon Resins Site Kearny, New Jersey	• Remedial Investigation and Feasibility Study • Pre-remediation engineering and development of engineering construction documents • Engineering support during remediation and post-remediation On-site water treatment system	• Excavation and removal of PCB contaminated soils • Excavation & removal of contaminated lagoon sediments. Sheet piling was used for excavation support. • Installation of cutoff wall & groundwater collection trench • • Decontamination of buildings & tanks • Asbestos removal & disposal • Demolition & disposal of existing building • Installation of permeable cover on site
Bridgeport Rental and Oil Services Site Bridgeport, New Jersey	• Construction/remediation • Engineering support during construction	• Excavation & removal of contaminated soils and sediments • On-site incineration of contaminated materials • Modification to existing water treatment system • Installation of temporary utilities (water, gas, etc.) and temporary facilities • Contractor plans & permit applications

Construction of Storm and Sanitary Sewers and Water Mains in 24th Street, Queens

New York City Department of Environmental Protection, Bureau of Sewers





Ebasco's is performing the resident engineering inspection services for this project which includes installation of 8-foot wide concrete box sewers, and 54-inch and 48-inch diameter reinforced concrete pipe.

Ebasco's scope of work includes the monitoring of all construction activities to insure that all work performed conforms to the construction contract documents, to good construction practice and to the standard practices of the City.

Reference: Mr. William Lipski
Deputy Chief of Construction
Bureau of Water Supply and
Washington Collection
New York City Department of
Environmental Protection
59-17 Junction Blvd.
Corona, NY 11368
(718) 595-5702

Radium Chemical Company

Client: **U.S. Environmental Protection Agency**
Project Location: **Queens, New York**

Ebasco was selected as the Prime Contractor by the United States Environmental Protection Agency (USEPA) Region II to perform the remedial designs and prepare the design documents for the remediation of the Radium Chemical Company Site. Ebasco also provided design engineering support during construction to the U.S. Army Corps of Engineers, the Construction Manager for the remedial action. This work was conducted from the Ebasco Lyndhurst, NJ office.

The Radium Chemical Company Site is located in Queens, New York and consists of a single stone brick building in an area classified as a light industrial/residential sector. The building is approximately 10,000 square feet in size. Of this, 7,220 square feet are associated with the Radium Chemical Company and the balance is a portion of the adjacent building which was leased to Radium Chemical Company. The site is bordered by a major expressway on the east, a heavily travelled road on the north and west and an adjoining building on the south.

The Radium Chemical Company initially produced luminous paint for watch dials and instruments. Later, the company manufactured, leased and sold radium-226 in the form of radiation therapy and radiographic sources to hospitals, medical centers and research laboratories. The radium sources were stored on site in lead containers in a poured concrete vault. In 1983, the State of New York suspended Radium Chemical Company's operating license due to various disposal and safety infractions. The facility has since been abandoned by Radium Chemical Company. In 1988, the USEPA undertook a limited emergency removal action under CERCLA to secure the facility and remove the radioactive sources. A follow-up radiological survey was performed. Based on the survey results the USEPA conducted a Focused Feasibility Study of remedial alternatives for the Radium Chemical Company Site under CERCLA. USEPA signed a Record of Decision on June, 21, 1990, officially selecting a remedy for the Radium Chemical Company Site. Partial decontamination, dismantling and disposal to an approved disposal facility was selected as the most appropriate alternative for site remediation.

Based on the selected remedial alternative, Ebasco performed remedial design and developed design specifications and drawing packages which facilitated the negotiations and subsequent engagement of a general contractor for site remediation under the management of the U.S. Army Corps of Engineers (USACE). Ebasco performed the remedial design and developed the design documents on a fast track basis and completed the assignment on schedule and within budget. These specifications and drawings were reviewed by the USACE Kansas City and New York Districts for compliance with USACE/USEPA Region II requirements. The Ebasco design documents were praised as a product with the highest quality standard and the project received the USEPA's highest performance rating.

During the construction phase of the project, Ebasco participated in the pre-bid meetings and provided support during bid evaluations and negotiations. Ebasco reviewed contractor submittals including QA and Health and Safety Manuals.

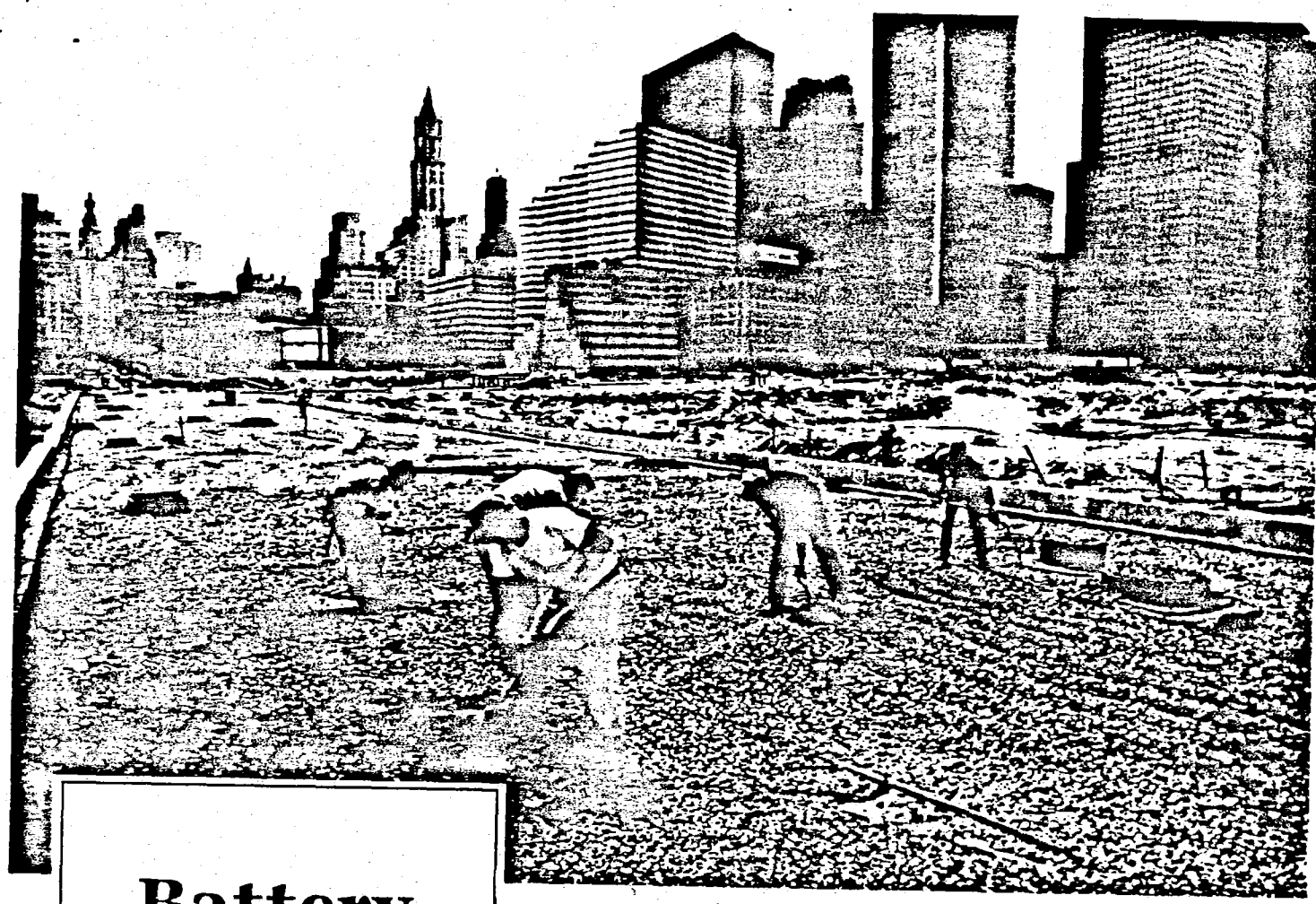
Decontamination of the walls and floor slab was accomplished by removing the surface of the materials using scabbling and vacuum blasting. Materials with inaccessible surfaces of high surface-to-volume ratios (i.e. wood, lath, sheet rock, sheet steel and light structural steel) were not decontaminated and were disposed of as NORM waste. The decontamination standards used for smooth surfaces (e.g. steel) and walls were in accordance with U.S. Nuclear Regulatory Commission Regulatory Guide 1.86. The clean-up limit for bulk materials, i.e. building debris, to be disposed of off-site as "clean materials" was 5 pCi/gram of radium concentration or a surface measurement of less than 5000 dpm alpha per 10 cm^3. After decontamination, the Radium Chemical Company building was demolished and disposed of off-site.

The contaminated water generated by decontamination of equipment was solidified and disposed of off-site.

The roofing materials and floor tiles identified as having asbestos containing materials were removed and disposed of off-site.

The soils on the site contaminated above appropriate limits were removed and disposed of at an approved facility. The soil was considered contaminated if it contained greater then 5 pCi (above background) of Ra-226 per gram of soil for subsequent 15 centimeter layers. For purposes of this determination, the concentration was averaged over an area of 100 square meters.

The site and the portion of an adjacent building were restored. The site was backfilled with clean soil from off-site sources, graded, top-soiled, fertilized and seeded.



Battery Park City

Project Name: Battery Park City Authority Roadway Design and Other Infrastructure Services

Project Location: Battery Park City, New York City

Construction Value: $30 Million

Service Provided: Provide Contract Plans, Specifications and Inspection Services

Project Description: Ebasco was selected to provide Contract Plans and Specifications for the Roadway Network and other Infrastructure for the North End of the Battery Park City Complex in New York City. The project consists of roadway design, including lighting and landscaping, underground utilities such as water and sewer main as well as survey, borings, etc. Of particular significance on this project is the coordination with all New York City Agencies for approvals in their respective areas of responsibility. All drafting services for this project will be performed by Ebasco in-house CADD equipment. Construction inspection services are provided during construction.

EBASCO

Burnt Fly Bog Site

Client: **New Jersey Department of Environmental Protection and Energy**
Project Location: **Marlboro Township, New Jersey**

Ebasco was contracted by the New Jersey Department of Environmental Protection and Energy to perform field investigations, evaluate remedial action alternatives and provide design and construction management at an uncontrolled hazardous waste site formerly utilized for oil storage and processing operations. PCBs, trichlorethane, lead and benzene have been found at the Burnt Fly Bog site located in Marlboro, New Jersey. Approximately 60 acres of Upland and Westerly Wetland near the southeastern corner of the 1700-acre Burnt Fly Bog had been contaminated as a result of improper dumping.

A portion of the site, the Upland, had already been investigated and a recommended remedial action selected. For the Upland, which includes four lagoons, contaminated soils, asphalt piles and buried wastes, Ebasco's responsibility consisted of determining the physical extent of contamination, and subsequent implementation of the recommended remedial activity (removal of contaminated soils). Ebasco prepared detailed design drawings and specifications and bid documents for the excavation, treatment and removal and disposal of contaminated soil. Final site grading was installed over a clay cover intended to limit the intrusion of surface water.

An initial identification and screening of remedial alternatives was carried out for the Westerly Wetlands. This initial screening was based upon the remedy's ability to mitigate the health and environmental concerns brought out in the risk assessment of the site. Those alternatives passing the initial screening were evaluated in detail as to their cost, implementability, permanency, health and environmental impact during construction, etc. Results of the evaluation showed that total encapsulation was the most cost-effective alternative.

Ebasco then prepared detailed design plans, specifications, and drawings for the selected alternative.

The design called for excavation of contaminated soils and sludges, backfilling with clean soil, grading and capping. The cap consists of a clay layer and soil layer, placed and compacted. A layer of topsoil was also placed and the site revegetated.

Ebasco provided construction management for the remedial action at Burnt Fly Bog including construction supervision to ensure that the work was performed in accordance with contract construction drawings and specifications. Ebasco managed the contracts with the Prime Contractor and his subcontractors. In addition Ebasco assured implementation of health and safety and QA/QC protocols and provided contingency air monitoring and community relations support.

Ebasco worked directly with the NJDEPE and assisted them in dealing with the USEPA. Technical support was also provided to NJDEPE in their community relations program, which included conducting public hearings. Although NJDEPE was the regulating agency, Ebasco is responsible for ensuring that site activities are in compliance with federal, state and local regulations. These included OSHA standards, TSCA criteria, and RCRA applicability, stream encroachment, water quality, air quality and soil erosion, and sediment control.

Syncon Resins Site

Client: **N.J. Department of Environmental Protection and Energy**
Project Location: **Kearny, New Jersey**

The Syncon Resins National Priority List site is an inactive paint, resin, and varnish production facility located in New Jersey. The site is within a coastal wetlands management area. The production facility includes reactor buildings, vessels, large bulk-storage tanks, unlined lagoons, underground storage tanks, and associate piping systems. Ebasco was contracted by the NJDEPE to conduct a remedial investigation/feasibility study at the site, and to develop conceptual designs for site remediation.

The scope of services for this project included field investigations to determine the nature and extent of contamination and included soils, water, and air sampling and analyses; selection of remedial response objectives and identification of alternatives; laboratory studies for the full range of priority pollutants including volatile organic compounds, metals, PCBs and gross alpha and beta radiation; evaluation of remedial action alternatives; and conceptual design of remedial measures for the site. Ebasco's QA/QC and chemistry staffs also provided oversight of all subcontractor analytical laboratories. A risk assessment and feasibility study report were completed for the site, and the Record of Decision was issued in 1986.

In support of feasibility and design studies for this project, detailed hydrogeological, groundwater quality, and geotechnical investigations were performed. In addition, treatability study tests were performed to evaluate several technologies which could have been used to remediate the water which resulted from natural flushing and on-site surface decontamination activities. Technologies which were evaluated for their applicability included chemical precipitation, coagulation, and biological treatment.

Ebasco also prepared the detailed design of the selected alternative. Elements of the design include the following:

- Containment, including installation of an impermeable barrier and cut-off wall for groundwater diversion/collection.
- Decontamination and treatment, including removal of tank contents and building contaminants for off-site or on-site treatment.
- Removal and disposal, including removal of lagoon sediments, highly contaminated building contents (i.e., piping, equipment, etc.), grossly contaminated soils, and the remains of the demolished Oil Building for off-site disposal.
- Capping, including the placement of a permeable, rainfall infiltration cover to prevent direct contact with contaminated surface soils while allowing natural flushing of contaminants and collection for treatment.

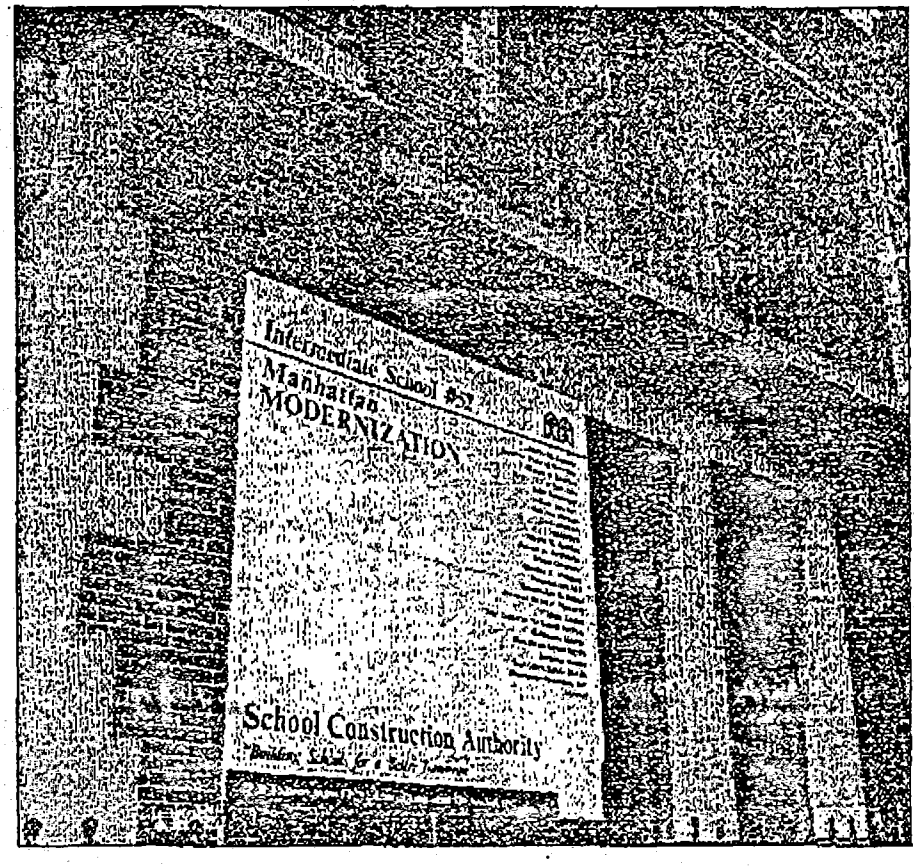
  Sheet piling was installed around lagoon perimeter to support side slopes during sediment excavation and removal.

Ebasco's contract was extended to provide construction oversight during remediation. The site remediation was accomplished successfully with assignment of highly qualified resident engineering and home office engineering support groups.

I.S. 52 & P.S. 176

Manhattan, New York

New York City School Construction Authority



Ebasco is currently the Construction Manager for a two-part Manhattan school project under the auspices of the New York City School Construction Authority.

The first part of this construction effort required the rehabilitation and modification of I.S. 52, a five-story school building. Ebasco managed and coordinated the construction, as well as monitored the performance, of one Prime Contractor and as many as 20 subcontractors (at peak).

Work on the school began in May, 1990, and is scheduled for completion in December, 1992.

Five floors have been completely remodeled, including the auditorium, the gymnasium, and the kitchen area. In order not to interrupt the education of the more than 1,200 students, phase construction was implemented. Included in the rehabilitation of this 117,000 sq. ft. structure is the refurbishment of the electrical, HVAC, and plumbing systems.

The construction of P.S. 176 comprises part two of this contract. Ebasco is preparing all supplemental General Specifications, as well as performing all value engineering and constructibility/design reviews. An important aspect of this project is the waste remediation of the site itself. Construction of the 600-student school commenced in September, 1992 and is scheduled for an August, 1994 completion.

Construction Cost:	$34 Million
Contract Fee:	$2.2 Million
Completion:	1994

Reference: NYC School Construction Authority
30-30 Thompson Avenue
Long Island City, NY 11101-3045
Greg Rutherford
Project Manager
(718) 392-3737

Bridgeport Rental and Oil Services (BROS) Site

Client: **U.S. Army Corps of Engineers**
Project Location: **Bridgeport, New Jersey**

Ebasco is currently remediating the lagoon and conducting project site cleanup of the Bridgeport Rental and Oil Services (BROS) site located in Logan Township in southern New Jersey. This $52.5-million contract with the U.S. Army Corps of Engineers, Kansas City District, is one of the largest projects under the Superfund program. The site, encompassing a 26.4-acre tract of land, of which the waste oil/waste water lagoon covers 12.7 acres, is contaminated primarily with polychlorinated biphenyls (PCBs), hydrocarbons, and metals. The lagoon averages 12 to 18 feet in depth and penetrates the aquifer. The objectives of the remediation are to maximize the on-site cleanup activities to the greatest extent possible and to provide a permanent solution to the site contamination problem.

The remediation activities for this lagoon will consist of installing and operating a mobile rotary-kiln incinerator using the latest oxygen enhanced, low NO_x technology and installing a CPE geomembrane beneath the planned location of the rotary-kiln incinerator. Ebasco will incinerate 5 million gallons of waste oil and other volatile solvents and will use the current on-site treatment system to filtrate approximately 120 million gallons of organic compounds, base neutrals, and other organics from water. Further, Ebasco will remove and incinerate approximately 100,000 cubic yards of soil and sludge and remove and incinerate or dispose 100 tons of drums and debris, including solidification/chemical fixation of undelisted incinerator ash. Finally, Ebasco will backfill the lagoon (230,000 cubic yards) with clean off-site soil and oversee site restoration and closeout.

This project will be accomplished using a phased approach:

- Phase I- Site
- Phase II- Lagoon Cleanup and Incineration
- Phase III - Lagoon Oil and Sediment Removal
- Phase IV- Lagoon and Project Site Closures
- Phase V- Project Closeout

Each phase is divided into major tasks with each task being further divided into subtasks. The following are brief descriptions of each phase of the project:

Phase I - Site Development

This phase encompassed preparation of the site to support pretrial burn and final site remediation and consists of site preparation, physical characterization of the lagoon, erection of the Thermal Destruction Facility (TDF) and a trial burn for the TDF. Site preparation activities included construction of permanent access roads, construction of parking areas for the support trailers, installation of site utilities, temporary barrier fencing, clearing, and grubbing prior to the construction of the utilities and preparation of staging areas. Site preparation also involves the construction of decontamination facilities, erosion control ditches, and diversion berms to minimize contaminated stormwater. Contaminated soils in the site support and TDF areas were removed during site development and stockpiled for use as waste feed during the trial burn.

Phase II - Lagoon Cleanup

The second phase entails operation of AWTS to groundwater elevation and the removal of drums and debris from the lagoon.

Drums will be inventoried, sampled and evaluated for proper disposal. Drums exposed while lowering the lagoon water level to groundwater level will be removed. The wide range in size and location of debris requires individual assessment of each item. As each piece of debris is extricated from the lagoon, it will be rinsed and relocated to the staging area for further handling.

The larger items will be cut into manageable pieces by hydraulic shears and moved to the TDF. All contaminated soils, sediments, and debris, as applicable, will be incinerated in an on-site rotary kiln incinerator.

The system consists of a 25-ton/hour rotary kiln, ash conveyor, ash quench, quenched ash conveyor, cyclone particulate separator, secondary combustor, waste heat recovery fire tube boiler, gas quench, packed tower gas scrubber, effluent neutralization tank, solids removal filter press, draft motive steam/water high-energy scrubber, and stack.

Phase III - Lagoon Oil and Sediment Removal

The third phase involves the removal of all surface oil and floating debris within the lagoon, followed by the two-stage removal of lagoon sediments. Removal of the floating oil by booming the surface oil to a floating weir skimmer and vacuum pump will remove as much of the oil as possible. Oil will be staged in tanks and sampled for waste characterization prior to thermal destruction.

Sediment will be removed in two stages using two methods of excavation: conventional methods will be used for areas above the groundwater level; and secondly a

submersible horizontal cutterhead/pump dredge was planned to be used for areas below the groundwater level. This method couldn't be operational due to the presence of a large quantity of debris embedded in sediment at bottom of lagoon. The construction method being used is by isolating areas with silt curtains and excavating by crane with cable arm bracket. During the first stage, lagoon sediment to within six inches of the excavation limit will be removed with the final six inches being removed in the second stage.

Phase IV - Lagoon and Project Site Closure

The fourth phase of the project includes the Lagoon and Project Site Closure consisting of lagoon backfilling, levee removal, ash disposal, as well as solidification, site drainage, and final grading, followed by topsoiling and seeding.

Phase V - Project Closeout

The final phase is Project Closeout. The site will be closed and permanent access roads and fences installed. Temporary facilities and utilities will be disconnected and removed; equipment will be decontaminated and removed. The aqueous waste treatment system will be left intact and contaminated material not capable of being incinerated will be contained and transported offsite to an approved hazardous waste landfill.

Air quality tasks on this project include preparation of an air quality impact assessment and review of the proposed incinerator by the NJDEP. This analysis also involves modeling of existing sources in the area and preparation of a risk assessment for incinerator emissions.

Allied-Signal Properties

Client: **Allied-Signal Aerospace Company**
Project Location: **Teterboro, New Jersey**

The site was the location of a Navy/Allied program investigating the use of thorium magnesium alloys for aircraft castings. A foundry operation began in 1945 and was discontinued in 1968. The magnesium thorium slag was drummed and used to stabilize a stream bank. Chemically, the operations conducted on site over their 50 years of operation included a full spectrum of materials including VOC's (solvents such as 1,1,1-trichloroethene, tetrachloroethane), metals, total petroleum hydrocarbons, base neutral/acid extractables, benzene, toluene and xylene, and others.

The site encompasses about 100 acres and was divided for this work into 13 operable units. The work is being conducted through a series of purchase (task) orders and to date is well over $2 million. **RI/FS** elements completed include **characterizing** the nature and extent of the contamination, **risk assessment, development of cleanup alternatives, conceptual design** of the **remedial action** and remeidation of the thorium/radium contamiantion.

Two separate lines of **investigation** were conducted, **hazardous** and **radiological**. For each, investigation work, health and safety, field operations and QA/QC plans were developed. These plans were based on plant operational history operational history, previous sampling data, and site inspections. The elements are comparable to USEPA remedial investigation requirements.

Currently, Ebasco is in the process of **designing a groundwater treatment facility** which will include the emplacement of a **slurry wall** to the saturated zone, saturation of the unsaturated zone, injection of surfactant, and **extraction** of **groundwater** and surfactant by a well point system. The extracted materials are ion-stripped producing clean water, recovered surfactant and contaminated residue. The clean water then be reinjected.

A major portion of the investigation included **sampling soils, sediments, groundwater and surface water** for VOC, BNA, **PCB,** THC, metals, uranium, throium and radium. Over 400 samples, and QA blanks were analyzed.

During the radiological investigation, the Ebasco Team employed two **innovative techniques** to rapidly and cost effectively locate areas with thorium and radium contamination. The first was the use of an equilateral triangular grid rather than a rectangular grid for the area wide gamma surveys. The triangular grid provided significantly better area coverage using the same number of points as would be used with a rectangular grid. This optimization enhanced the detection of "hot spots" at a considerable savings in labor. Ebasco also established a field screening **laboratory** to rapidly screen for thorium and radium in soils. The detection equipment used at Allied was cross calibrated with DOE's Environmental Measurements Laboratory equipment to assure that "clean" concentrations (less than 5 pCi/gm per 40 CFR 192) were accurately and rapidly determined. This provided considerable savings in labortory time and costs, whild effectively delineating the "hot" areas on site.

Ebasco has successfully designed and implemented a program to **excavate and transport radioactively contaminated soils to a licensed NORM disposal facility**. Included in this phase of the work was the **design** of a **sheet pile retaining** wall system to allow excavation of contaminated soils adjacent to a stream.

Ebasco also provided **construction management** and **environmental support** for all activites described and also for the **excavation** and **disposal of PCB** contaminated soils and the **removal** of four 200,000 gallon **underground storage tanks**.

Berkeley Heights Chemical Plant

Client: **Chevron Chemical Company**
Project Location: **Berkeley Heights, New Jersey**

Ebasco was recently awarded a contract by Chevron Chemical for the remedial design and cleanup of a former specialty chemicals manufacturing plant in Berkeley Heights, New Jersey. During the project, various engineering disciplines will be used including geological, hydrogeological, bioremediation, civil, chemical and QA/QC. The four acre site borders the Passaic River and has 11 underground storage tanks, extensive soil and groundwater contamination and scattered lagoons filled with contaminated material containing PCBs, heavy metals, VOCs, mercury, Phenols, toluene, xylene and sludge.

The first step in this project was preparation of the Remedial Action Plan (RAP). The RAP outlined the design of the various elements of the selected remedial alternative, as well as, identifying additional field investigation and sampling activities (pre-design work) required to supplement the existing database and support the design process.

Major remedial design elements for the selected remedy consists of encapsulation, an in-situ bioremediation system and extraction trenches/wells and re-injection trenches/wells. The encapsulation element of the RD includes designing a subsurface barrier (i.e., slurry wall) surrounding the site and keyed into relatively impermeable glacial deposits as well as the design of an impermeable cap over the entire site. The in-situ bioremediation element consists of treating extracted water and the addition of nutrients before reinjection. Location, number and depths of the extraction and re-injection trenches had to be determined to support the design.

The landfill cap design includes two types of cover systems; soil-clay cap and soil-geosyn-thetic cap. The selection of the type of the cap depended on the slope stability analysis results. The composite or multi-layered cap over gentle slopes consists of a very low density poly-ethylene (VLDPE) membrane underlain by a low permeability polypropylene bentonite sandwich providing a uniform layer of clay in carbet form, a geosynthetic drainage layer with geotextile over VLDPE, and a vegetative layer consisting of common fill and top soil. The soil-clay cap system over steep slopes consists of a layer of 1-foot thick clay, VLDPE, 1-foot thick drainage layer, geotextile fabric layer, 18 inches of common fill, and 6 inches of top soil.

Ebasco has completed implementation of the field activities outlined in the RAP and Field Sampling and Analysis Plan (FSAP). These field activities have included a soil vapor study, installation of additional monitoring wells, groundwater sampling, biodegradation treatability study, aquifer testing, slurry wall mix design testing, and additional soil borings. Presently the data collected during the field investigation and results of the laboratory testing are being reviewed and evaluated for utilization in the remedial design. The project is currently into the preparation of engineering design and drawings and permitting phases.

The Construction is anticipated to begin in early 1993 and will include installation of the groundwater treatment system including the bioremediation system, landfill cap and soil-bentonite slurry trench cutoff wall.

Somerset Generating Power Station Wastewater Treatment and Circulating Water Systems

Client: **New York State Electric & Gas Corporation**
Project Location: **Somerset, New York**

Ebasco performed complete engineering, design, construction and project management services for the entire Somerset Station. As part of this project, Ebasco developed a comprehensive solid and liquid waste system design for the facility, and a Circulation Water System (CWS) designed as an open loop system withdrawing water from and discharging to Lake Ontario. The main features of these systems were:

Circulative Water System:

- A Circulating Water System included the following components:
  - A precast concrete intake structure embedded in the lake bottom
  - A 9-foot diameter concrete lined intake tunnel, extending from the intake structure to a pump house on shore. The tunnel is 100 feet below ground and runs approximately 2,740 feet
  - A 9-foot diameter concrete lined discharge tunnel extending for approximately 2,580 feet and located 100 feet below ground
  - A 400-foot long nine-port stage diffuser to allow for optimum mixing and dispersion of the discharge water
  - An onshore circulating water pump house
  - A seal weir structure

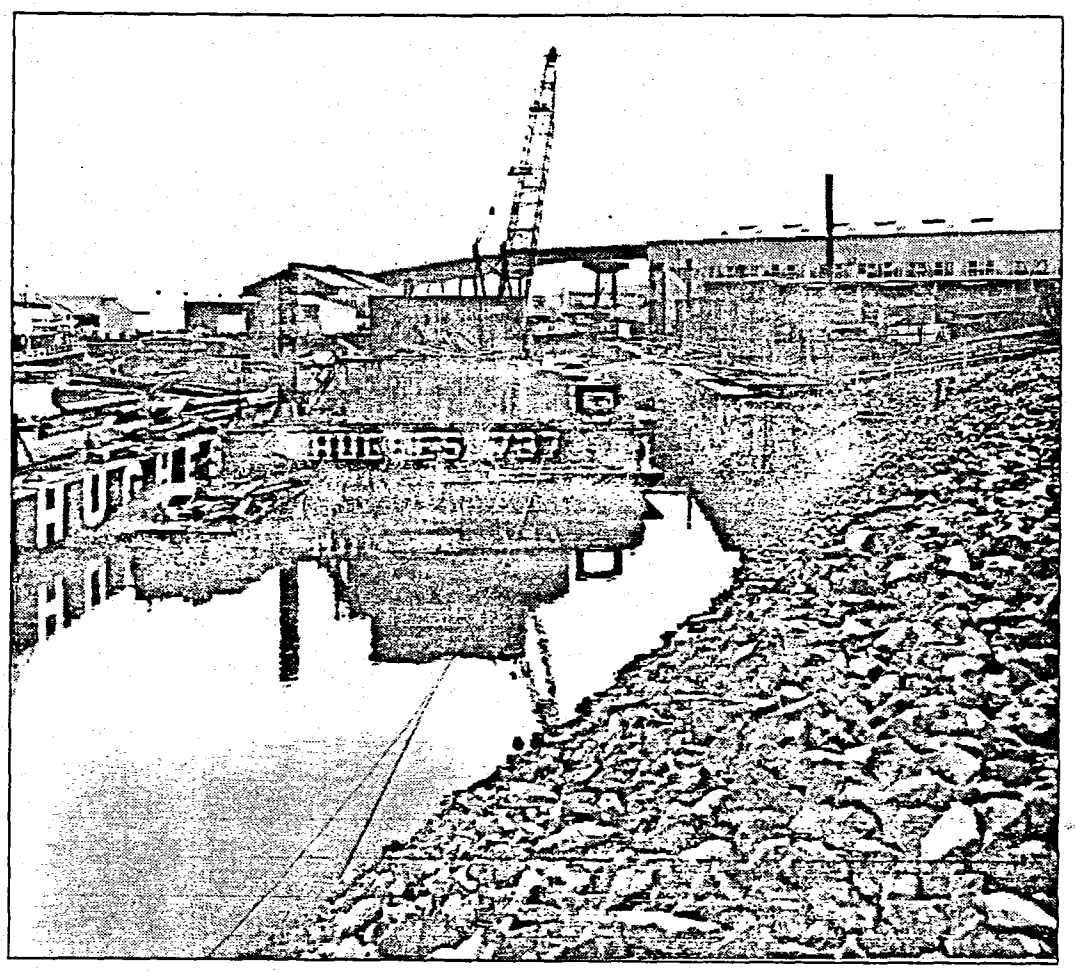
Design of the CWS required careful planning and a unique combination of construction techniques to meet extremely rigorous schedule and environmental requirements.

Wastewater Treatment System:

- A wastewater treatment system was designed for two trains, each operating at a process flowrate of 800 gpm for a total treatment rate of approximately 2.5 MGD. The wastewater treatment plant was designed as an integrated, comprehensive unit such that all water, wastewater and solid waste treatment systems formed an efficient, cost-effective unit that would comply with all regulatory requirements.

Hamilton Avenue Marine Transfer Station, Brooklyn

Department of Sanitation
New York City



Ebasco provided design overview, shop drawing review and approval, and construction management for a new barge staging pier in Brooklyn. The pier is to be used for barge docking and consists of wooden and concrete decking, steel cofferdams, steel and timber piling, fendering system, dolphins with mooring cleats and motorized bollards.

Ebasco also provided resident engineer and inspection services for the installation of a subsurface concrete diaphragm wall designed to protect the base of an existing adjacent warehouse during construction and operation of the barge storage facility. The wall was installed by the slurry trench method of excavation using a clamshell. The diaphragm wall was constructed in six panels 20 feet wide, 70 feet deep and 3 feet thick, and had a heavily reinforced rebar cage installed through the slurry. Concrete was then pumped, displacing the bentonite slurry.

Design and construction of a rip-rap embankment was included in the project scope of work. As part of the design process, stability analyses were performed for the embankment. A hydrographic survey was made and dredging performed for barge and boat berthing. The pier is provided with all mechanical and electrical facilities, power, lighting, plumbing, fire protection and cathodic protection systems. Total construction cost for the project was approximately $6 million.

Reference: Anthony C Zarillo
Assistant Commissioner
Department of Sanitation
New York City
51 Chambers Street, 8th Floor
New York, NY 1007

Construction Management

Client: **School Construction Authority**
Project Location: **New York, New York**

Ebasco is currently the construction manager of a two-part Manhattan school project for New York City School Construction Authority.

The first part of this $40 million construction effort required the rehabilitation and modification of I.S. 52, a five-story school building. Ebasco managed and coordinated the renovation and construction efforts, as well as monitoring the performance of the Prime Contractor and as many as 20 subcontractors (at peak). This work included remodeling of all five floors, auditorium, gymnasium, and the kitchen area. A phased construction was implemented so as not to interrupt the education.

The rehabilitation of the structure also included the refurbishment of the electrical, HVAC, and plumbing systems.

The construction of P.S. 176 comprises part two of this contract. Ebasco prepared the supplemental General Specifications and performed all value engineering and constructibility/design reviews. The P.S. 176 building (77,000 sq. ft.) itself is being constructed utilizing a prototypical modular design. This design concept utilizes a single system to accommodate both a 600- and a 900- student facility and separates the programmed areas into classrooms, administration, common areas and a connector module for vertical circulation. The Classroom Module is sized for 300 students. Teacher support, administration offices, and specialized programs are housed within the Administration Module, which is centrally located between the Classroom and Commons Module to act as a control zone.

Long-span spaces such as, the auditorium, the cafeteria, the gymnasium, necessitated the Commons Module. This separate structures offers the option to function independently of the balance of the school for community or after-hours use. All of the modules are designed to afford accessibility to the handicapped and offer state-of-the-art designs to Fire Alarm and Fire Detection Systems. This modular approach not only saves time and excessive costs, but provides a uniformity to all future New York City school buildings, while simultaneously affording architectural conformity to neighboring buildings, regardless of location.

An integral portion of the site clearance is the remediation of the soil surrounding a leaking gasoline underground storage tank, which already existed on the site. This required the toxicity testing for mixed wastes, remedial excavation, and then removal of contaminated soil. To ensure that the subsurface for the building's foundations remain "passive," a high-density polyethylene membrane will be placed beneath the foundations.

The bearing piles (161) have been driven, some as deep as 40 feet to bedrock, to ensure that the structure's foundations (21,500 cu. yd. of concrete) were properly shored. The installation of pile caps, foundation footings, and grade beams are in progress. Structural steel (440 tons) will be erected next. An accelerated schedule was implemented so as to meet scheduled construction completion date of January, 1995.

ATTACHMENT C

PROPOSAL TO PROVIDE CONSTRUCTION MANAGEMENT/ OWNER'S REPRESENTATIVE SERVICES

to

PFIZER, INC.

for the

QUEENS VILLAGE SITE

Lehrer
McGovern
Bovis

Lehrer McGovern Bovis has performed construction management services for many of the world's most distinguished pharmaceutical manufacturers. Our client list includes Merck, American Cyanamid, Sandoz, Burroughs Wellcome, and Glaxo. From the very beginning of a project, our participation continues through each stage to the successful completion and turnover. The resources of LMB offer each client a unique opportunity to obtain the finest level of craftsmanship and highest level of technology available in the industry.

LMB's core group of industrial/manufacturing facility specialists are experienced in the latest construction management technologies and know how to execute their responsibilities with an eye on quality, schedule, and budget. They also know how to successfully coordinate construction activities with ongoing operations in occupied spaces and realize that it is vital for the finished product to function as well as it looks. Our team consists of construction professionals experienced in the specialized nature of pharmaceutical manufacturing facilities. This team utilizes LMB's unique preconstruction management process to effectively define project scope, while at the same time establishing the core for cost and schedule control. Throughout the construction and close-out phases, they continue to deal with the critical issues of safety, quality, value analysis and validation.

LMB is ready to provide you with:

- Creative, dedicated and experienced professionals (over 500 in the New York office)
- A proven track record of achieving schedule and financial commitments for clients
- Comprehensive experience that enables us to hit the ground running at project kick-off
- A commitment to understand and respond to each client's specific needs
- A strong team approach recognizing the importance of the architect, engineer, special consultants, and the owner's input and priorities

Our experience will provide you with the comprehensive skills to successfully complete your project within the constraints of cost and schedule.

About Lehrer McGovern Bovis

Lehrer McGovern Bovis, Inc. is a national leader in providing professional program management, construction management and consulting services. We have frequently been recognized for such high visibility projects and unique accomplishments as the restoration of the Statue of Liberty, the renovation of Ellis Island, the program management of the recently completed EuroDisneyland just outside of Paris and London's massive Canary Wharf development built out into the Thames River. Recently we were chosen from a field of 170 submissions as Program Manager for all of the 1996 Summer Olympic Games facilities in Atlanta, Georgia.

Since its inception, LMB has put over $10 billion worth of work in place. Headquartered in New York City, LMB has full service operations in Princeton, New Jersey; Washington, D.C.; Ithaca, New York; Indianapolis, Indiana; and Los Angeles, California. But, the heart of this company is not in any specific office or city, it is located on its many project sites all over the country. Though national in reach, LMB manages every project, according to the same philosophy. First, every job is critical to the client's business and second, every project, no matter what the size, is unique.

Rising to the challenges presented by its clients is the hallmark of LMB's success. In a service business like ours, the number one objective must be fulfilling our clients' interests. This philosophy has proven successful – our clients keep coming back: more than 60% of our business comes from repeat clients, and another 18%, from referrals. The terms used to describe us include flexible, creative and responsive. We like what we do and we share in our clients' pride of accomplishment. This attitude has fueled our growth which, over the last five years, has been steady.

In 1990 and 1991, Engineering News Record ranked LMB among the top five construction management firms in the nation. In 1992, as the cornerstone company of Bovis, Inc., we were ranked number two by ENR.

Parent Companies

Lehrer McGovern Bovis is an indirect subsidiary of Bovis Inc. Below we have provided a description of LMB's parent companies.

Bovis — The Global Construction Group

The Bovis Construction Group, based in the United Kingdom, is one of the largest, most sophisticated construction groups in the world and operates both in its domestic marketplace as well as internationally. At the outset of the 1990's Bovis companies are managing over $12.5 bil-

lion worth of contracts, employing 7,000 staff in over 20 countries. Bovis' global expertise is provided through 30 national and regional companies covering the UK, the USA and the rest of the world. Of these, the principal companies are:

- Bovis Inc. In the USA, this firm has three major subsidiaries, Lehrer McGovern Bovis in New York, McDevitt Street Bovis in Charlotte, North Carolina and Schal Bovis in Chicago, Illinois. Peter Lehrer, Chairman of Lehrer McGovern Bovis is President and CEO of Bovis Inc.
- Bovis International Limited. A firm which has subsidiary companies and contracts in Europe, Africa, Asia and Australia.
- Bovis Construction Limited. This company is headquartered in London and operates throughout the UK.

Bovis and P&O

The Bovis Construction Group is a major division of The Peninsular and Oriental Steam Navigation Company, one of the world's most successful shipping, transport, property, construction, house building and service companies.

Founded in 1837 and incorporated by Royal Charter in 1840, P&O has its origins in the days when Britain's merchant and passenger shipping fleets first spanned the world, establishing the company from the outset as an enterprise of international proportions.

Today, P&O remains a world leader in shipping, with a fleet of cruise liners, ferries, container ships and bulk cargo carriers. Other P&O activities include road haulage, warehousing, cold storage, port operation, conference and exhibition centers, commercial catering and property management. P&O is one of Europe's leading internationally-based companies, employing nearly 65,000 people in more than 250 companies and operations in some 40 countries throughout the world.

P&O has established its presence in the major financial markets of the world. Its shares are listed in London, Paris, Amsterdam, Frankfurt, Sydney and Tokyo. In the USA, P&O shares are traded through a sponsored ADR facility.

Our association with P&O provides financial stability and strength unparalleled in the construction community today.

Lehrer
McGovern
Bovis

Project Approach and Schedule

Our management approach as your Construction Manager/Owner's Representative is direct and straightforward. We tailor our available skills, experience and resources to meet your specific, immediate and long-term needs. Each project is unique and requires specific experience and knowledge to obtain cost and schedule efficiencies. By integrating our understanding of the construction process with the work of designers and engineers, LMB is able to reduce costs, speed construction and enhance the value of your project.

LMB has broad experience in performing remediation studies and environmental control. Because many of our projects require complex infrastructural requirements, such as large scale utility relocation, LMB places paramount importance on planning and proper safety and containment procedures. Our capabilities also encompass management of the removal of contaminated materials from a site, including asbestos abatement; development of safety remedial plans; and preservation of existing fragile environments and areas of significant historical significance.

Additionally, where previous property owners have been found responsible for remediation and cleanup costs, LMB has identified, tracked and segregated these incremental costs over and above the normal cost of excavation.

There are several responsibilities adopted when one assumes the role of Construction Manager and Owner's Representative. Below we have detailed what we believe to be our major responsibilities should we be selected to serve you in this role.

Construction Phase

Scheduling

- Monitor project progress against master schedule by trade
- Recommend correct schedule actions as required

Cost Control

- Review for action all field change order requests
- Review for action all claims for additional time
- Monitor project progress against target budget

Coordination of all Consultants, Contractor and Owner Activities

- Attend regular project meetings
- Establish design review meetings as required

Quality Control

- Define inspection requirements for materials and workmanship
- Recommend specialty inspections as may be required
- Coordinate sign-offs by Pfizer
- Coordinate regulatory agency inspections and sign-offs
- Review for action site safety conditions

Close-Out Phase

Coordinate Final Inspections and Sign-Offs

- Review for action all project records submitted by the General Contractor (as builts, handbooks, etc.)
- Assist Architect/Engineer in preparation of punchlist items
- Establish schedule for punchlist completion

Cost Control

- Finalize receipt of claims from Contractor
- Recommend final payments

DEAN RICCI
VICE PRESIDENT
LEHRER MCGOVERN BOVIS

Education

Clarkson University, Potsdam, NY — Bachelor of Science degree in Mechanical Engineering
Adelphi University, Garden City, NY — Master of Business Administration

Profile

Mr. Ricci's 18 years of diversified management experience in the construction industry includes some of the most high-profile undertakings in recent years: Canary Wharf, the world's single largest commercial development to date, constructed in London; the restoration and renovation of the historic Ellis Island National Monument in New York Harbor, the most ambitious undertaking of its kind in American history; and EuroDisneyland Phase II, near Paris, the largest theme park on the European continent.

Experience

EuroDisneyland, Marne-la-Vallée, France
Project Executive, Preconstruction

Mr. Ricci was responsible for managing preconstruction services for the second phase of EuroDisneyland, planned as a theme park similar to the MGM Studios in Florida. As one result of his work, Disney selected Bovis International as contractor for the construction of the second phase. Before the project was put on hold, Mr. Ricci's accomplishments included:

- Coordinating design development work with Walt Disney Imagineering Project Management (conceptual design), Bechtel Inc. (construction documents), and Bovis International staff located on-site near Paris. He commuted several times between Disney's home office in California and the Paris office to conduct work, including preparation of the bid package for the second phase infrastructure.

- Mr. Ricci managed all preconstruction services, including logistics planning, estimating, buying and packaging strategies, constructability reviews, value engineering, identification of temporary utilities requirements, baseline scheduling, and tailoring construction procedures established in the first phase of the project to the second phase.

- In an effort to improve Bovis International services on the second phase project, Mr. Ricci also reviewed the historical experience on the first phase and recommended enhancements.

Canary Wharf, London, England
Project Executive, Infrastructure

Mr. Ricci was responsible for the design and construction of more than $500 million worth of infrastructure for this massive development. Canary Wharf encompasses nine office buildings, a retail center, and public and support spaces totalling more than six million gross square feet, making it the largest single commercial development in the world. The structures span 70 acres of old dock facilities which are extended by 120 acres over the adjacent Thames River. Mr. Ricci's accomplishments included:

- Worked as an extension of the owner's project management staff, representing Olympia & York's interests in building and coordinating a team comprised of dozens of specialized consultants, and in interfacing with government and statutory authorities at every level. Supervised the efforts of two management contractors.

- Among the infrastructure completed under Mr. Ricci's direction was:
  - creation of new, marine-pile supported grade decks tripling the size of the existing quay,
  - a system of temporary and permanent bridges facilitating access of people and materials to the site,
  - extension of existing utilities — including gas, water, sewer, telecommunications, and electricity lines — beneath water (via culvert) and under roads,
  - stabilization of quay walls, and construction of 500' of slurry walls to keep water from parking structures,
  - construction of three subgrade parking structures totalling 1,900 spaces,
  - design and construction of nearly $20 million of stonework in public spaces alone, including England's largest stone fountain,
  - design and construction of extensive custom-made details for public spaces, including gates, bus shelters, benches, and streetlamps,
  - miles of new private and government-adoptable roads including the largest enclosed roundabout in England,

- transport, storage and planting of 300 large-caliper trees, purchased three years in advance from West Germany, and planted as construction in appropriate areas was completed, and
- value engineering that saved tens of millions in materials, scheduling and manpower costs.

- Coordinated site construction with separately-contracted ongoing improvements to the Docklands Light Rail system, which traverses the site. Also worked closely with officials of the London Underground system on the expansion of service to the site, and the planning of the new Jubilee rail station.

Ellis Island National Monument, Ellis Island, New York
Project Executive

The scope of restoration at Ellis Island has been compared to the Palace of Versailles and Leningrad's Hermitage. It remains the largest restoration program of its kind undertaken in American history, and required complex coordination and great sensitivity to intricate historical details. Mr. Ricci began work at Ellis Island as a Project Manager. Within three months he assumed the duties of Project Executive.

Mr. Ricci's accomplishments at Ellis Island included:

- Scouted, hired and supervised a team of more than 200 contractor, subcontractor and consultant personnel of variety of specialist disciplines.

- Constructed on a fast-track schedule a 1,458 foot-long bridge linking site with New Jersey. Bridge facilitated transport of equipment, materials, and workers to the site. Also used boats and barges as transport vehicles to and from the site.

- Coordinated Installation of necessary power and utilities for the island. Mr. Ricci saw that necessary permits were obtained and worked closely with such organizations as the Army Corps of Engineers, the Coast Guard, the New Jersey Department of Parks and Department of Environmental Protection, New Jersey Public Service Electric and Gas, and NYNEX. Directed the underwater routing of telephone, gas, water and electricity lines from Manhattan and New Jersey to the Island. Also managed the renovation and upgrade of the Island's powerhouse, including installation of new chimney and water tower.

- Managed construction of other infrastructure, including dock, sea wall, underground fuel tanks, and access roads. Stabilized subsidiary buildings on Island, preventing further deterioration from occurring.

- Met with donors and foundation specialists and integrated various donated materials and services into project.

- Directed renovation and restoration of 282,000-square-foot Main Building. Work included drying out interior via use of huge fans; replacing metal roof with elaborate copper domes (and spires, which were put in place using helicopters); exterior brick and stone restoration, structural steel and concrete work, and installation of new air conditioning system, heating system (which used existing radiators), and other mechanical systems.

- Supervised addition to Main Building which included oral history center, exhibit galleries, modern theaters, library, and restaurant, located in wings separate from the historic portion of building.

- Managed thousands of change orders resulting from extensive unforeseen conditions.

- Helped to develop sophisticated, computer-driven cost control reporting system to meet the specific needs of the Ellis Island Foundation and National Park Service. Using such software programs as Primavera, LMB was able to bring complex project issues to light so that remedial action could be taken on a more timely basis. This system developed and enhanced on the Ellis Island project is the model for the sophisticated System used by LMB and the rest of the industry today.

ELI I. JAZRA, P.E.
PROJECT MANAGER/SUPERINTENDENT
LEHRER McGOVERN BOVIS

Education

The University of Michigan — Master of Science, Engineering
(Construction Engineering and Management)
The American University of Beirut — Bachelor of Engineering
(Civil Engineering)
New York University — Diploma, Real Estate
(Investment Analysis)

Profile

Mr. Jazra has more than eight years of construction experience, including project management, construction testing, and engineering design. His responsibilities have included the management of contractors and consultants, on-site construction inspection, cost control and scheduling on major projects. As a Site Inspector, he acquired hands-on experience by performing laboratory and field testing on soil, concrete, steel and asphalt for many construction projects. Recently, Mr. Jazra held the position of Senior Estimator in LMB's Technical Services Group. In addition, he has extensive computer experience in Local Area Networks.

Selected Experience

- **British Airways Terminal, JFK International Airport, Jamaica, NY.** Assistant Project Manager. Responsible for coordination of construction activities, cost control, scheduling and contract administration. Project entailed the renovation of existing terminal, a new addition of 120,000 square feet including six new gates and the replacement of eight existing loading bridges. Site work activities involved sheeting and shoring of new underground facilities. Project value: $125 million.

- **461 Fifth Avenue, New York, NY.** Owner's Representative. Assured implementation of proposed plans and specifications, reviewed requisitions and change orders during construction. Construction value: $30 million.

- **420 Fifth Avenue, New York, NY** – Estimator. Responsible for estimating costs for the construction of a 29-story office building. Construction value: $70 million.

- **660 Madison Avenue (Barneys Department Store), New York, NY.** Assistant Project Manager. Responsible for coordination of subcontractors and consultants, review of change orders and negotiations on behalf of the Owner. Project entailed new interior construction, replacement of the facade, rock excavation, relocation and addition of new columns, including jacking of the building and intensive structural work.

- **Kings County Hospital, Brooklyn, NY.** Estimator. Responsible for estimating and value engineering for a new hospital building and for the renovation of existing facilities. Construction value: $600 million

- **Holiday Beach, Beirut, Lebanon.** Assistant Superintendent. Responsible for implementation of plans and specifications, scheduling of manpower, delivery of materials, and quality control for a beach condominium (250 units) including a new 2,500-foot Marina.

- **Terminal One, JFK International Airport, Queens, NY.** Senior Estimator. Responsible for conceptual estimating and value engineering for a new passenger terminal to house five major airlines. Construction value: $260 million.

- **Veterans Administration Medical Center, Brooklyn, NY.** Senior Estimator. Responsible for cost estimating and value engineering for a new hospital. Led a five-day value engineering shop with project savings of over $4 million. Provided constructibility report and reviewed Plans and specifications for adequacy and completeness. Construction value: $36 million.

Selected Industrial Manufacturing Client List

Lehrer McGovern Bovis, Inc.
Selected Industrial/Manufacturing Clients

Lehrer McGovern Bovis

ACCO Agriculture Research Division	IVAC Corporation
American Cyanamid Company	Merck & Co
AT&T Communications Union	Merck Sharp & Dohme
AT&T Resource Management	Mobil Corporation
Baxter Healthcare Corporation	Northwestern University
Burroughs Wellcome Company	Norton-Simon, Inc.
Carbide Agricultural Products	Nova Pharmaceutical
Coca-Cola Company	Penn State/Morlock Development Group
Columbia University	Pennsylvania Power & Light Company
Cornell University	Pfizer, Inc.
Dome Corporation	Renault/Chrysler
Eagle Gypsum Products, Inc.	Roche Biomedical Laboratories, Inc.
Fiorucci Foods, USA	Rutgers University
General Foods Corporation	Sandoz Pharmaceutical
Glaxo, Inc.	Sandoz Research Institute
Glaxo Group Research, LTD	Somey Systems
Glaxo Pharmaceutical, Inc.	UCLA
Goldman Sachs Corporation	Underwriters Laboratories, Inc.
Herman Miller, Inc.	United Technologies Corporation
Hewlett-Packard, Inc.	University of Maryland at Baltimore
IBM Corporation	Waste Management, Inc.
Imperial Group, LTD.	Westinghouse Elevator Company

Technical Project Experience

Technical Project Experience

Project Name	Project Size	Date	Location		Owner
Acco Agricultural Research Development	136,000,000	1992-1997	Princeton	NJ	American Cyanamid
St. Lukes Medical Center	99,400,000	1984	Chicago	IL	Rush-Presbyterian-St. Lukes Med. Ctr.
General Goods Corporate Headquarters	75,000,000	1984	Rye	NY	General Foods Corporation
AT&T Corporate Headquarters	66,000,000	1988	Bridgewater	NJ	AT&T Resource Management
*Merck Sharp & Dohme Pharm. R&D Lab	55,000,000	1993	West Point	PA	Merck & Co.
Glaxo Stockley Park	54,000,000	1992	Heathrow	UK	Glaxo Pharmacuetical, Inc.
*Merck Sharp & Dohme Site Utilities Expansion	51,000,000	1994	West Point	PA	Merck & Co.
*Sandoz Pharm. Vivarium - Revamp/New	50,000,000	1993	East Hanover	NJ	Sandoz Research Institute
Sandoz Pharmaceutical R & D	50,000,000	1988	East Hanover	NJ	Sandoz Research Institute
*Merck Sharp & Dohme Bio Support Lab	45,000,000	1993	West Point	PA	Merck & Co.
Pfizer Laboratory - Phase II	40,000,000	1989	Sandwich, Kent	UK	Phizer, Inc.
Penn. Power & Light Facility	34,000,000	1994	Hazelton	PA	Pennsylvania Power & Light Co.
*Eagle Gypsum Wallboard Mfg. Facility	31,500,000	1990	Eagle	CO	Eagle Gypsum Products, Inc.
*Agricultural Biotechnology Building	29,200,000	1993	New Brunswick	NJ	Rutgers University
Materials and Life Sciences Facility	29,000,000	1991	Evanston	IL	Northwestern University
Biotechnology Laboratory	28,200,000	1988	Ithaca	NY	Cornell University
Clinical Research Center	26,000,000	1991	Baltimore	MD	Dome Corporation
Nova Pharmaceutical Headquarters	25,000,000	1993	Baltimore	MD	Dome Corporation
*Global Agricultural Research Center	25,000,000	1989	Princeton	NJ	American Cyanamid Corporation
Baxter Headquarters/R&D Complex	23,200,000	1985	Deerfield	IL	Baxter Healthcare Corporation
Max Factor Production & Dist. Facility	22,011,000	12/80	Oxford	NC	Norton-Simon, Inc.
*Biological Sciences Research Facility	20,000,000	1992	Los Angeles	CA	UCLA
Loma Alta Center	20,000,000	1988	Beverly Hills	CA	Summer & Associates
Burroughs Wellcome Lab	18,198,000	6/86	Research Triangle	NC	Burroughs Wellcome Company
Glaxo Computer Center	18,000,000	1991	Stevenage	UK	Glaxo Group Research Ltd.
AT&T R&D Complex	18,000,000	1989	Naperville	IL	AT&T Communications

* Projects Executed by LMB's Technical Division

Project Name	Project Size	Date	Location		Owner
Michael Reese Hospital	17,800,000	1990	Chicago	IL	Michael Reese Hosp. and Med. Ctr.
*Chemistry Research Laboratory	17,000,000	1992	Los Angeles	CA	UCLA
*Center for Computer Aids for Ind. Productivity	16,800,000	1991	New Brunswick	NJ	Rutgers University
Union Carbide Technical Center	16,000,000	4/80	Research Triangle	NC	Union Carbide Agricultural Products
Otis Elevator Research Tower	16,000,000	1987	Bristol	CT	United Technologies Corporation
Fiorucci Metal Processing Plant	15,000,000	1987	Richmond	VA	Fiorucci Foods, USA
Underwriters Laboratories	12,988,000	1/85	Research Triangle	NC	Underwriters Laboratories, Inc.
*Marine Science Building	12,500,000	1992	New Brunswick	NJ	Rutgers University
*Neuroscience Building	12,400,000	1993	New Brunswick	NJ	Rutgers University
*Small Manufacturing Process Facility	12,000,000	1993	College Sta.	PA	Penn State/Morlok
Renault Paris Dist. Center	12,000,000	1984	Swindon	UK	Renault/Chrysler Corp.
Physics and Astronomy Building	11,700,000	1990	New Brunswick	NJ	Rutgers University
IBM Communications Lab	11,389,000	4/88	Research Triangle	NC	IBM Corporation
The Horizon Factor	11,000,000	1971	Nottingham	UK	John Player & Sons
Springs Mills Dye & Finish	10,000,000	1/89	Various Sites	SC	Springs Industries, Inc.
Hewlett-Packard R&D Center	10,000,000	1982	United Kingdom	UK	Hewlett-Packard, Inc.
Warehouse Manufacturing Facility	10,000,000	1989	Various Sites	CA	Sunslispe, Inc.
Burroughs Wellcome - Building 8	9,628,000	8/88	Greenville	NC	Burroughs Wellcome Company
Glaxo Administration Building 1	9,000,000	4/87	Research Triangle	NC	Glaxo, Inc.
Environmental Monitoring Laboratory	8,000,000	1988	Geneva	IL	Waste Management, Inc.
Herman Miller Facility	8,811,000	9/80	Roswell	GA	Herman Miller, Inc.
John Hancock Properties, Pacific St.	8,500,000	1989	Union City	CA	Koll Union City Associates
*General Research Lab	8,000,000	1991	Baltimore	MD	University of Maryland at Baltimore
Glaxo Administration Building 2	8,000,000	7/87	Research Triangle	NC	Glaxo, Inc.
Nelson Hall Laboratory	7,450,000	1990	New Brunswick	NJ	Rutgers University
Savage Hall/Lab Facilities	7,000,000	1989	Ithaca	NY	Cornell University
Merritt/IBM	7,000,000	1980	Fishkill	NY	IBM
Camden Business & Science Building	6,000,000	1989	Camden	NJ	Rutgers University
IVAC	5,957,000	8/81	Creedmoor	NC	IVAC Corporation

Project Name	Project Size	Date	Location		Owner
NSM Plant	5,500,000	1975	Stemson	UK	Imperial Group Ltd.
Roche Biomedical Laboratory	5,108,000	7/89	Research Triangle	NC	Roche Biomedical Laboratories, Inc.
Cyanamid Clinical Test Lab	5,000,000	1987	Princeton	NJ	American Cyanamid Corporation
Tesco Warehouse	4,000,000	1978	United Kingdom	UK	Tesco Corporation
Burroughs Wellcome - "S"	3,442,000	8/88	Research Triangle	NC	Burroughs Wellcome Company
Westinghouse Escalator Facility	3,670,000	8/89	Clinton	NC	Westinghouse Elevator Company
Coca-Cola Bottling Plant	3,000,000	1975	Edmonton	UK	Coca-Cola Southern Bottlers
*Somey Systems	3,000,000	1992	Edison	NJ	Somey Systems, Inc.
*Cook Campus Animal Care Facility	3,000,000	1990	New Brunswick	NJ	Rutgers University
*Mobile Research Building 13	3,000,000	1989	Hopewell	NJ	Mobile Corporation
*Space Sciences Building Addition	2,800,000	1989	Ithaca	NY	Cornell University
*Merck Sharp & DohmeWhole Animl. Pharm. Ren.	2,300,000		West Point	PA	Merck & Co.
Burroughs Wellcome - Building 1	2,157,000	6/88	Greenville	NC	Burroughs Wellcome Company
*Solid State Facility	1,600,000	1990	New Brunswick	NJ	Rutgers University
Chelsea Laboratories	1,473,000	6/86	Monroe	NC	Darby Group Companies
Goldman Sach's Print Shop	1,300,000	1990	New York	NY	Goldman Sachs Corporation
Glaxo-Pedestrian Bridge	1,135,000	11/89	Research Triangle	NC	Glaxo, Inc.
Glaxo-Bide Plaza	1,086,000	10/89	Research Triangle	NC	Glaxo, Inc.
*Modular Lab	800,000		Princeton	NJ	American CyanamidCorporation
Cyclitron Building	800,000	1986	New York	NY	Columbia University
Global Agricultural Research Ctr. Addn.	780,000	1987	Princeton	NJ	American Cyanamid Corporation
Burroughs Wellcome - Packing Expansion	739,000	5/88	Greenville	NC	Burroughs Wellcome Company
American Cyanamid Extruder Facility	650,000	1987	Princeton	NJ	American Cyanamid Corporation
Burroughs Wellcome - Pipe Bridge	580,000	11/88	Greenville	NC	Burroughs Wellcome Company
*Incinerator Facility	500,000		Princeton	NJ	American Cyanamid Corporation
Burroughs Wellcome - Asbestos Abatement	500,000	9/87	Greenville	NC	Burroughs Wellcome Company