UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Millennium Pipeline Company, L.P.,	)	
	)	
Appellant,	)	
	)	**AFFIDAVIT OF**
v.	)	**THOMAS E. PEASE, PhD, PE**
	)	
State of New York, Department of State,	)	
	)	
Respondent.	)	

STATE OF NEW YORK)
) **ss:**
COUNTY OF ALBANY)

THOMAS E. PEASE, being duly sworn, deposes and says as follows:

1 I am a Partner and Technical Advisor at Lawler, Matusky & Skelly Engineers, L.L.P. ("LMS"). I have been employed by LMS for over 30 years. At LMS, my principal responsibilities include supervision of environmental engineering and science projects and specifically hydrogeological studies. Prior to joining LMS, I had approximately two years of environmental engineering experience with another firm. I hold the degrees of Bachelor of Science in Physics from an accredited engineering school, Worcester Polytechnic Institute, a Masters Of Science Degree from the School of Engineering and Science of New York University (NYU), and a PhD degree (Doctorate) also from NYU. I am a Professional engineer in the State of New York and the Commonwealth of Pennsylvania. My professional experience includes over 30 years of experience evaluating environmental conditions through science and engineering studies, assessing environmental impacts, and mitigating impacts of contaminants in soil, sediment, surface water and groundwater. My work includes development of groundwater

resources such as well fields like the one used by Croton-on-Hudson. I have assessed impacts of constructing pipelines and other facilities. I have also been intimately involved with assessing well field and water supply-related issues of the Millennium Project (the "Project" or "pipeline"), particularly relative to the Village of Croton-on-Hudson's ("Croton's") well field (the "Wellfield"). A true copy of my resume is attached hereto and incorporated herewith as Attachment "A." Attachment "B" is a summary of my firm's capabilities. Attachment "C" is a list of the references I consulted in preparing this Affidavit.

2. I make this affidavit in response to many of the assertions set forth in the Reply Brief submitted by the New York Department of State ("NYSDOS") in connection with this appeal. More specifically, I make this affidavit to address the NYSDOS's claims regarding the risk to, and potential impact on, Croton's Wellfield and the adjacent Croton River from the Project. In this affidavit, I will (1) provide necessary perspective on the Project's magnitude as it pertains to the Wellfield; (2) describe LMS's initial assessment/evaluation of Wellfield issues, as they pertain to the coastal zone consistency determination; and (3) set forth the basis for LMS's conclusion that the Village's water supply will not be adversely affected or threatened, now or in the future, by the Project. I will detail, point-by-point, the rationale for my disagreement with the NYSDOS's contentions regarding both the alleged risks to, and potential impacts on, the Wellfield and the adjacent Croton River.

3. In short, as I have detailed below, the NYSDOS's theories (e.g., "curtain drain effect") and conclusions (i.e., that this Project poses an unacceptable risk to Croton's water supply, and measurably impairs the Wellfield's expansion potential) lack any principled, scientific foundation. Accordingly, this Affidavit (1) supplements the LMS reports that have been submitted for this Project (i.e., New York State Coastal Zone Consistency Determination,

January 2001, March 2001, and Addendum dated July 2001); and (2) supports an override of the NYSDOS's consistency objection.

BACKGROUND INFORMATION

Croton-on-Hudson Wellfield

4. Currently the Village's water supply system consists of three high capacity sand and gravel production wells within the 20 acre Wellfield. A recent memorandum from the Town Engineer (November 12, 2002) indicates the maximum day demand at 1.5 million gallons per day (mgd), which was achieved by pumping Wells 1, 3, and 4 over only an 18-hour pumping cycling at rates ranging from 441 gpm at Well 1 to 516 gpm at Well 4. As described in the Geraghty & Miller study (1988), the primary source of the water to the wells is through induced infiltration to the deeper portion of the aquifer from the nearby Croton River, which borders the Wellfield to the south. The hydrologic and water quality conditions of the River are the primary determining factor as to the quality and quantity of water available to Croton from the Wellfield.

Project Description Relative to the Wellfield

5. The Millennium Pipeline follows a 442 mile route from an interconnection at the US/Canada border in Lake Erie to Mount Vernon, New York. Throughout its length alternative routing was evaluated and implemented, where feasible, to minimize effects on existing structures and environmental resources. Eighty six percent of the route uses existing right-of-ways (ROWs) and easements. The construction of the pipeline will incorporate Best Management Practices (BMPs), a Spill Prevention, Control and Countermeasure Plan (SPCCP), current New York State stormwater management requirements, and detailed Environmental Construction Standards including restoration of disturbed areas and mitigation for potential unavoidable adverse effects. The proposed route for the pipeline crosses the Wellfield over a distance of less than 800 feet from Route 129 to the Croton River. Although the pipeline will be

buried in the shallow overburden soils far above the deep aquifer tapped for water supply, special mitigation methods will be employed in this area over the short time period that construction will occur.

6. The Project specifications include environmental protective measures. Those measures that will protect the Wellfield include:

- Erosion controls along the perimeter of the trenched area. The project will minimize turbidity in runoff and soil erosion.
- Diversion of run-on from the excavation vicinity. Run-on is surface drainage that would otherwise run into the work area and the open trench. By controlling it, the site will not be subject to additional water to control and the surrounding area will have minimal impacts from turbid water that flows through the construction area.
- All fueling of vehicles will be done outside of Zone 1 of the Wellfield.
- The Village Engineer will be apprised of the construction schedule in the Wellfield. To the extent that the Village has concerns for its Wellfield, its engineer can inspect operations as judged appropriate and assure that the agreed to measures are being implemented to minimize the potential for impacts on the Wellfield.
- Concrete covered pipe will be used in the Wellfield to eliminate the need for trench dewatering. (The concrete covered pipe will sink below any water in the trench.) Consequently no point discharge of water is needed and no flow from the trench to the groundwater or vice versa will occur.
- Pipe joints are welded so that no solvents are used.

- Vehicles carry spill kits, and other requirements of the SPCC Plan are followed.

7. The specific proposed route for the pipeline across the Wellfield was selected by the Village Engineer in consultation with Millennium to minimize potential impacts to the Wellfield by having the pipeline cross the aquifer in the narrow northern portion.

Initial Analysis Of, And Conclusions Regarding, Wellfield Issues

8. The aquifer characteristics at the site are well known through both field studies (exploratory drilling, aquifer testing) and modeling studies performed by Geraghty & Miller (1988). The modeling study indicated that a sustained aquifer yield of 11 million gallons per day (mgd) could be achieved, which is more than 7 times the maximum daily projected demand.

9. The Geraghty & Miller report (1988) provides a number of conclusions and recommendations regarding the Wellfield that are intended to optimize the Wellfield yield through improvements in well efficiency. For example, the report recommends replacing two shallow inefficient wells with a deeper well, and distributing the pumping over a wider area in the Wellfield. These would be significant steps toward reaching the 11 mgd Wellfield potential.

10. My prior analysis and assessment of potential impacts of the Project on the Wellfield led to the following conclusions:

- The greater yield of the aquifer is from deep in the aquifer, not at shallow depths where the pipeline will be installed.
- Present average day demand from the Wellfield is only one tenth of its capacity.
- The Project construction will not significantly impact the Wellfield.

- There is no credible mechanism for impacts to the water supply from gaseous leaks in the pipeline.
- The Project will neither interfere with nor limit the future expansion of the capacity of the Wellfield, especially given the high permeability of the aquifer at the Wellfield.

ISSUES RAISED IN NYSDOS REPLY BRIEF

Generic Plans

11. The Project plans and specifications, including the SPCCP, BMPs and erosion control specifications have been developed by experienced engineers and environmental professionals, and incorporate experience in constructing thousands of miles of gas pipelines in various geological settings over decades. The specifications reflect a balance between sufficient specificity to ensure that the environment will be protected during construction, and sufficient flexibility to allow the field inspectors to correctly apply the required safeguards at each location as the Project advances. If a project has excessively specific requirements, the inspectors supervising the work cannot make field adjustments to optimally apply the required features such as erosion controls, the management of trench water, and responding to rain events during construction. The inspector needs specific environmental protection standards and criteria, and authority with flexibility in the specifications to allow the inspector to apply the safeguards optimally for each segment of the Project.

Significance of Zone 1 Designation

12. The zones of protection established around the Wellfield in the Geraghty & Miller aquifer protection plan (1989) are based on the hydrogeology and the topography of the surrounding area. Zone 1 is the immediate wellhead protection area closest to the Wellfield and

actual pumping wells. Each of the zone designations is intended to be used as a land use management tool and does not translate into findings of unacceptable risks to each of the zones. The plan does identify various potential sources of contamination to the aquifer, since there is presently development in the area and Route 129 passes directly by the Wellfield. With respect to the proposed pipeline, its construction in Zone 1 poses no threat for any greater impact than what already exists in and around the Wellfield. The Wellfield already has roads, a treatment facility, and pipelines in the area. On completion of Project construction, the potential for impacts is below quantitation levels and there is no reasonable potential for impact as a result of piping natural gas across each of the protection zones.

Site-specific Aquifer Studies

13. The NYSDOS Reply Brief cities a number of studies and reports which it claims support its conclusions. Careful review of these documents indicates that in many cases the NYSDOS conclusions go far beyond the conclusions in the cited report. Specifically:

- O'Brien & Gere appears to have performed no independent site specific investigation or analysis.
- Further, to suggest that the URS Draft Source Water Assessment ("SWA") prepared for the NYSDOH (November 26, 2002) provides new third-party evidence of potential impacts is simply incorrect. The assessment relies on existing information and does not include site specific studies (all 14,000 sources in NYS were evaluated during this assessment). The URS study was simply to compile and organize information in order to make more informed decisions regarding the source water evaluation and delivery of safe public drinking water. The program does not impose any

new mandates or regulations for protecting sources of drinking water. Since the Wellfield has been extensively characterized by prior investigations (which I interpreted in my evaluations), the SWA does not provide any new evidence that the pipeline is an unacceptable risk; it simply reiterates what is already known and assigns a program specific sensitivity rating.

- The NYSDOS conclusions drawn from the Geraghty & Miller 1988 report fail to recognize that the primary objectives of the Geraghty & Miller recommendations were to optimize the Wellfield's potential yield of 11 mgd. Specifically, NYSDOS concludes that the recommendation to abandon two upper wells and replacement of the wells with a deeper well near OW-5 somehow indicates that the only suitable area for further development is along the proposed pipeline ROW when this is actually not the case. The high permeability of the Wellfield soils mean that a well just outside of the pipeline ROW will easily capture all of the available groundwater under the ROW; so the prohibition of new wells within the 50 ft ROW will not deter the Village from future capacity. The Geraghty & Miller 1988 report does not recommend against further development in the southern portion of the aquifer area, it only outlines an option to maximize yields by distributing the pumping across the Wellfield. Considering that the Wellfield is apparently capable of a sustained yield of 1 mgd and the current maximum day demand is only 1.5 mgd, optimizing the yield to 11 mgd is not a relevant goal anytime in the foreseeable

future. Apparently the Village had a similar interpretation of the Geraghty & Miller recommendation and rather than distributing the pumping among locations, selected a location for Well #4 in the southern portion of the Wellfield in 1992.

Expansion Potential of the Wellfield

14. Construction of the shallow gas pipeline across the Wellfield will not limit the aquifer capacity that can be tapped by placement of wells avoiding the pipeline ROW. If the northern portion of the Wellfield is suitable for high capacity supply wells, positioning them to avoid the relatively small area occupied by the ROW will not significantly change the potential yield from the Wellfield, since a relatively extensive area of suitable sands and gravels in direct hydraulic connection are tapped by the well to achieve high yields. The pipeline itself is only a shallow feature which has no effect on the deeper buried portions of the aquifer that are the most prolific water bearing zones that would support future expansion at the Wellfield.

"Curtain Drain" Effect

15. During pipeline construction the bedding material is interspersed with trenchline barriers designed to prevent preferential flow along the pipeline. The specifications for this feature are included in the Environmental Construction Standards for the Project. These barriers can be installed in the Wellfield if requested by the Village Engineer. Owing to the high permeability of the overburden soils in the vicinity of the Wellfield, however, water available for infiltration will infiltrate through the native soils, and not preferentially drain along the compacted pipeline trench soils. Therefore, concerns regarding this supposed "curtain drain" effect are unfounded.

Alleged Impacts to the Croton River Gorge and Downstream Areas

16. The NYSDOS Reply Brief further asserts that the pipeline would adversely affect the natural resources of the Croton River Gorge, impair the area's function as an important riparian and wetland habitat, and adversely impact the Croton River Significant Habitat which is more than a mile downstream. The NYSDOS position regarding impacts to the Croton River in the Gorge, and the downstream significant habitat in Croton Bay, does not take into account the measures Millennium will take to minimize the factors which could cause increased erosion, turbidity or sedimentation in the river. The work within the streambed will be conducted in the dry, using the dam and pump method, which has been approved by the NYSDEC in its Section 401 Water Quality Certification for the Project. This technique shunts the river flow from just above to just below the work area so the work is not in contact with the river. The timing of the work will be adjusted within the work window of July 1 to November 30. Weather and upstream reservoir operations will be monitored to select a four day interval that minimizes the chance that a major storm event would occur during the work. Because the river is maintained at a low flow during the work by reservoir operations, and because the upstream reservoir system can store large quantities of short term runoff, the potential for a flood event in the Gorge during the work is very low.

17. Another concern raised by the NYSDOS is for disturbance of the river substrate. The substrate of the river at the crossing site is coarse, consisting mainly of cobble rubble and gravel. It contains very little fine-grained sediment that could be washed downstream.

18. The Project work on the banks of the river and on the adjacent lands will be protected from erosion by the methods described in earlier paragraphs, so that no significant impacts to the river occur from that work. Together, these measures will minimize the potential for any downstream effects of the Project on the river and bay habitat, and aquatic life in these

areas. As such, concerns about the Croton Gorge and the distant, downstream significant habitat are equally unfounded.

CONCLUSIONS

19. The NYSDOS Reply Brief cites several erroneous characteristics of the Project and my studies and analyses. The site does not include any "cliffs" (steep bedrock outcrops) near or in the Wellfield. The Brief refers to "A Project of this magnitude," but the Wellfield portion of the Project addressed in that portion of the NYSDOS Brief and in my analyses is a ten foot deep trench over a distance of less than 800 ft that will be completed (and the site restored) within two weeks. This is truly a small project. It is in a suburban area that is developed for residential housing, water supply and recreation. The Project does not impair existing uses or future similar uses.

20. The NYSDOS Reply Brief claims that I have performed no studies of my own. To the contrary, I have carefully reviewed the prior work at the Wellfield by Geraghty & Miller, O'Brien & Gere and by URS. I have interpreted the aquifer permeabilities and transmissivities, and the possible effects that the Project might have due to its construction. I have analyzed the aquifer characteristics to determine whether any future uses of the Wellfield would be impaired by the pipeline's location. My analyses and conclusions in this affidavit, as in my prior analyses and interpretations, are founded on the specific aquifer characteristics and well tests for the Croton Wellfield reported by Geraghty & Miller (1988, 1989) and O'Brien & Gere. There is no disagreement over the characteristics of the aquifer or the existing wells; so there is no need for me to perform new field work.

21 The Project plans and specifications are sufficiently protective of the groundwater in the Wellfield, that no adverse impacts from the Project are likely to occur. There are no contaminants that can be discharged during the construction so as to impact the Wellfield. After

construction, the operation of the pipeline will have no significant effects on the environment or on the operation of the Wellfield. Even if Croton wants to increase the yield of wells located in its Wellfield, or for that matter expand its Wellfield in the future, the Project will not impede such future development. The high permeability of the Wellfield soils means that any well near the Project ROW will capture all of the available groundwater under the ROW; so the prohibition of new wells within the 50 ft ROW will not deter the Village from future capacity. Even if a new well is located to the north of the pipeline, water lines can easily pass over the gas line. In fact, the pipeline is being buried with extra cover to allow such a crossing.

22. The NYSDOS erroneously hypothesizes that the trench opened for the pipeline will somehow provide a conduit for contaminant migration. The trench will be open for the shortest time feasible to lay the pipeline and there is no mechanism for contaminant discharge, nor for contaminant migration toward or in the trench.

23. The NYSDOS overstates the significance of a URS report compiled for the New York State Department of Health (NYSDOH). The report was compiled from existing information for the NYS Source Water Assessment Program. Since the Wellfield has been characterized by site-specific study, the SWA does not provide any new evidence relevant to pipeline impacts. In short, construction, operation, and maintenance of the pipeline when done in accordance with the specified mitigation measures, will not affect the Wellfield in any significant way.

24. The Project will cross the Croton River using a dry construction method so that the construction will not be done in the River. This procedure in combination with the safeguards taken on the banks of the River and adjacent lands assure that no significant impacts

will occur in the River, and hence no impacts are anticipated on the Gorge habitat or downstream areas.

Dated: April 18, 2003

THOMAS E. PEASE, PhD, PE

Sworn to before me this
18th day of April, 2003

LINDA M. CONTE
Notary Public, State of New York
No. 01CO6074261
Qualified in Rockland County
Commission Expires May 13, 2006

Notary Public
80765

PEASE, THOMAS E.

EDUCATION

Ph.D., School of Engineering and Science
New York University, 1977

M.S., School of Engineering and Science
New York University, 1969

B.S., Physics
Worcester Polytechnic Institute, 1965

REGISTRATIONS

Registered Professional Engineer in the State of New York and Commonwealth of Pennsylvania

CERTIFICATIONS

Supervisor of Health and Safety Operations at Hazardous Materials Sites, 29CFR1910.120 (e)(3) and (4) as defined by OSHA and mandated by SARA.

MEMBERSHIPS

Air and Waste Management Association
American Geophysical Union
American Society of Civil Engineers
National Groundwater Association

REPRESENTATIVE PROJECTS

Lawler, Matusky & Skelly Engineers LLP — 1972-Present
Pearl River, New York

Partner and
Technical Director, Environmental Assessment & Management Group — Present

Manager, Environmental Assessment & Management Group — 1985-Present
Dr. Pease is a partner in the firm and the technical advisor of LMS' Environmental Assessment & Management Group. He supervises environmental scientists and engineers conducting investigations and consulting on hazardous and toxic waste, geology, and groundwater for public agencies and private industry. The group develops and negotiates approval of remedial plans. He supervises engineering services of the Mid-Atlantic Office in Allentown, Pennsylvania. He has developed site plans, permits, and other approvals based on his extensive environmental science and engineering training. He has supervised the assessment of environmental impacts of facilities and various contaminants on the coastal zone and other navigable waters. Dr. Pease supervises hydrogeological projects for the development and assessment of groundwater supply systems,

interpreting yield and quality, and recommending protective measures for wells and assessing impacts that projects may have on groundwater supply systems.

Dr. Pease assisted several law firms in Pennsylvania, New York, Delaware, and New Jersey relating to CERCLA and National Contingency Plan (NCP) in support of litigation and remedial action negotiations. He has evaluated impacts of historical disposal, interim remedial actions, removals and long-term remedial plans. He has developed testimony on the "state of art" of investigations and remedial alternatives; provided litigation support for a Pennsylvania client relating to site characterization, classification of materials, and appropriateness of remedial response; assessed the cost effectiveness of the investigation techniques and the bioremediation of contaminated soils, and evaluated a major landfill containing arsenic wastes. In the latter case LMS inspected and videotaped much of the remedial program and was qualified as an expert witness for the subsequent trial. Dr. Pease has developed cost allocation methods for CERCLA sites and testified to the application.

Dr. Pease managed and supervised multiple RCRA and CERCLA projects ranging from site investigations through the development of remedial action plans. He served as project engineer and aided in the assessment and interpretation of groundwater movement, chemical contamination and extent, screening of remedial options, and development of recommended remedial measures. Dr. Pease assessed the migration of various contaminants in groundwater, including volatile compounds, PCBs, hydrocarbons, and metals. He has been responsible for the assessment of infiltration of contaminants in underdrains and storm sewers, and for assessment of impacts on receiving surface waters.

Dr. Pease has provided technical oversight of the following representative RI/FS investigations in New York and New Jersey. These projects have included the Hudson River Psychiatric Center (HRPC) in Poughkeepsie, New York; the Witco Corp. site in Perth Amboy, New Jersey; and the Combe Fill South Landfill in New Jersey. The HRPC site contains lead contamination from a demolished building and PCB spill residue; the FS for this site considered excavation and treatment alternatives for contaminated soil and debris. For the Witco site the RI scope was negotiated with the New Jersey Department of Environmental Protection (NJDEP) and Witco Corp., joint managers of the project. The RI investigated various areas of site contamination by metals, PCBs, and PAHs. The FS for the Witco Corp. site evaluated varying excavation scenarios and on-site incineration, on-site solvent extraction, off-site incineration and off-site landfilling for soils and sediments contaminated with PCBs, PAHs, and metals. For the Combe Fill South Landfill, remedial alternatives were evaluated and a conceptual design developed for the recommended alternative, which consisted of a multilayer cap, groundwater pumping system, on-site leachate/groundwater treatment, and active gas collection and treatment.

Dr. Pease has evaluated remedial plans for the Seaboard site in New Jersey, the largest MGP site in the country. He consulted on remedial development plans and developed refinements for the remedial plans to help protect adjacent sediments and surface waters.

Dr. Pease's group has assessed a coal tar disposal site where Orangeburg pipe was manufactured. The site redevelopment plan incorporates remediation of coal tars into the site development and monitoring plans. LMS successfully negotiated the remedial redevelopment plans with state agency and will be supervising the implementation of site remediation.

The Piermont site in New York was the subject of site investigations, an environmental impact statement (EIS), and remedial actions for toluene and PCB contamination. Multimedia site evaluations included soil, groundwater, surface water and air contaminants. Dr. Pease negotiated the remedial response with the state agency and succeeded in expediting the cleanup and site classification, so that the investigation and remedy were completed in 6 months.

FSs have been performed by LMS for numerous state and Federal Superfund sites under Dr. Pease's supervision. They include the Jones Sanitation National Priorities List (NPL) site (New York), the Havertown PCP site (Pennsylvania), the Big V site (New York), and others. The studies have evaluated remedial alternatives for metals, PCP, and solvent contamination, and led to federal and state approvals of proposed remedial activities.

Dr. Pease has supervised electrical utility research projects ranging from development of a PCB cleanup manual, to water quality standards, to microcosms, to PCB analysis work, to ash leachability and fish diversion studies. He has been responsible for electric utility projects throughout the last two decades, including contaminated sites, contaminant discharge permitting, and other environmental projects. His work at Resource Conservation and Recovery Act (RCRA) facilities has included groundwater investigations and soil studies. Corrective actions for PCB-contaminated sites have been developed for a number of clients in New York, New Jersey, and Pennsylvania.

LMS was responsible for ecological risk evaluations and for interpretation of sediment quality at other hazardous waste sites contiguous to the New York metropolitan estuaries. Dr. Pease supervised the risk assessment for the Pennsylvania Avenue and Fountain Avenue landfills on Jamaica Bay. LMS assessed the on-site wetland and upland habitat, performed aquatic sampling for fish and shellfish, and assessed bioaccumulation of metals and PCBs in aquatic fauna. The data were compiled with RI data to develop the risk assessment, the foundation for remedial decisions for the sites.

He served as the project manager for a series of projects for Central Hudson Gas & Electric Company, including RCRA compliance services and an ash leachability study. These RCRA studies included the installation of borings, quarterly sampling, and assessment and interpretation of the results. In these projects, developed data analysis techniques for isolating the effects of leachate from treatment facility seepage and natural groundwater constituents. Leachate indicators include toxic metals, pH, and conventional pollutants.

Dr. Pease provides ongoing consulting services for closure of hazardous waste tanks and impoundments for various industrial clients.

Dr. Pease managed site investigations for a site manufacturing reactive and lead wastes and negotiated the PADER approvals for the remedial plan and assisted in the SWMU designation and assessment. A Subpart X (miscellaneous unit) permit application covering air, soil, groundwater, and surface water impacts and emission controls was developed and reviewed favorably by EPA. The application focused on air emission, air dispersion, and subsequent soil contamination from heavy metals.

Dr. Pease manages projects to assess sites prior to real estate transfers for possible contamination. Some sites are undeveloped, some have been commercial or industrial properties, others are

agricultural lands. While many are found to be clean, others have petroleum, metals, PCB, or solvent contaminants originating from recent uses or from a century of site history. Projects are conducted to meet New Jersey ISRA requirements, or to meet SARA "due diligence" criteria.

Director, Environmental Projects Section 1975-1985

As a Project Manager, Dr. Pease provided critical review of EPA's 1984 draft water quality criteria, and proposed revisions to New York State's water quality standards. He managed environmental assessments of New Jersey shoreline development. He prepared plume predictions and assessments for several thermal discharges; developed permit applications for new outfalls. He also developed a guidance manual and conducted review of state water quality standards.

Dr. Pease managed a study of circulation, shipworm dispersion, and thermal plume dissipation in Barnegat Bay, New Jersey. The study included development of a mathematical model of the bay. He managed several projects evaluating priority pollutants in the Hudson River. He was project engineer for groundwater quality studies at a large industrial site.

Project Manager 1975-1980

Dr. Pease managed project for the Utility Water Act Group, a national affiliation of electric companies, to assess whether power plant impacts are quantifiable. Responsibilities included coordination among four other consultants, attorneys, and the utilities members of UWAG. Technical and client responsibilities for ESEERCO, Niagara Mohawk Power Corporation, and Power Authority of the State of New York studies on Lake Ontario. Managed multiple 316(a) and (b) assessments and assisted in negotiating study scopes and permit conditions with EPA and NYSDEC. Manager of numerical modeling studies for thermal outfalls and biological impacts of intakes in the Hudson River, Lake Ontario, Barnegat Bay, and the Red Sea.

Project Scientist 1972-1975

Technical and client responsibilities for thermal discharge assessments of six power stations. Directed four hydrothermal physical modeling studies by subcontractors for design of outfalls. Technical and report responsibility for preliminary power plant siting assessment of St. Lawrence River in New York. Technical responsibility for a two-year hydrothermal model study.

Consolidated Edison Company of New York, Inc. 1970-1972
New York, New York

Oceanographer
Directed and evaluated environmental consultants.

New York University 1967-1970
Office of Naval Research Contract

Researcher/Scientist
Conducted field research on coastal wind-driven circulation along the New Jersey coast. Served as chief scientist on numerous research vessel cruises. Served as field scientist on several cruises to the Gulf Stream and Cape May.

Rutgers University 1969-1970
New Brunswick, New Jersey

Geology Department - Adjunct Faculty
Department of Meteorology - Adjunct Faculty

National Science Foundation 1964

Summer Student Fellowship Hydraulic Model of Planetary Circulation

LITIGATION SUPPORT

Enterprise Landfill	Consulting	Drinker Biddle & Reath
Tybouts Corners Landfill	Deposition	Morgan Lewis & Bockius
Haviland Complex	Consulting	Sive Paget & Riesel
Jones Sanitation	Consulting	Whiteman Osterman & Hanna
Lyncott Landfill	Consulting	Morgan Lewis & Bockius
Echo Avenue	Expert Report/ Deposition	Con Edison Co. of NY, Inc.
New Windsor Landfill	Expert Report/ Deposition	Kieffer & Hahn
Whitmoyer Laboratories	Deposition	Pepper Hamilton LLP
Whitmoyer Laboratories	Testimony	Conrad, O'Brien, Gellman & Rohn
Ethan Allen	Consulting	Kieffer & Hahn
Chromalloy (Sequa)	Affidavit	Morgan, Lewis & Bockius
Ashland Chemical	Consulting	Morgan, Lewis & Bockius
Bethlehem Iron Works	Deposition & Testimony	Tallman Hudder & Sorrentino
Stauffer (5 sites)	Expert Report/ Deposition	Spriggs & Hollingsworth
Davis Liquids	Deposition	Morgan, Lewis & Bockius
Viskase	Deposition	Marlowe, Snowe & Atticks, P.C.
ECDC Environmental	Affidavit	Phillips Nizer Benjamin Krim & Ballon
Wallkill Landfill	Expert Report/ Deposition	Kieffer and Hahn
Mimi Cleaners	Testimony	Sive Paget & Riesel, PC
Park Lane Company LP	Deposition	McRory and McRory

Chester Industrial Park	Testimony	NYS Department of Environmental Conservation
Portec	Expert Report	Bond, Schoneck & King
Clarkstown v. Goldberg	Expert Report/ Testimony	Town of Clarkstown
Akzo	Deposition	Morgan, Lewis & Bockius LLP
Inman Avenue Corp.	Testimony	Inman Avenue Corp.

PAPERS, PUBLICATIONS, AND PRESENTATIONS

"Surface Water, Groundwater, and Other SEQRA Assessments". Presented at the SEQRA 25th Anniversary Conference and Training Institute sponsored by Albany Law School. March 16, 2001.

"Disclosure and Ethical Obligations in Environmental Assessments and Impact Statements". Presented at the Annual Meeting of the New York State Bar Association, Environmental Law Section. 29 January 1999.

"Technical Issues in Environmental Liability". Presented at the Continuing Legal Education Seminar sponsored by the Internal Revenue Service. August 1997.

"Making Strides in Risk-Based Cleanups". Presented at the Albany Environmental Breakfast Club. 7 February 1997.

"Urban Waterfronts 14: The Dynamic Waterfront: A Worldwide Urban Success Story". Presented at The Annual International Conference on Urban Waterfront Planning, Development and Culture, Boston, Massachusetts, 14-16 November 1996.

"Brownfields: Expediting Risk-Based Remediation". Presented at the 28th Mid-Atlantic Industrial and Hazardous Waste Conference, Buffalo, New York, 15-17 July 1996. (with R.M. Fritsch and W.K. Ahlert)

"A Risk Assessment Case Study and New Developments in Planning Remediation." Presented at the Conference on Current Topics in Environmental Management: Air, Hazardous Waste, Water, Wastewater, Groundwater in November, 1995 (with R.M. Fritsch)

Soil Preparation Requirements for a High Temperature Metals Recovery (HTMR) System. Presented at the I&EC Special Symposium September, 1995. (with S.A. Handy and J. Bitler)

Subpart X Status; Lead Mobility in Groundwater. Presented at the Workshop on Characterization and Remediation of Explosives-Contaminated Soils, Environmental Performance Cooperative, Inc., Chattanooga, Tennessee, October 21-22, 1993

Issues Concerning the Characterization of Lead Contaminated Sites. Presented at the Workshop on Explosive Contaminated Soils, Environmental Performance Cooperative, Inc., Wilmington, Delaware, April 14-15, 1993

An evaluation of PCB analyses in soils. Presented at 1993 PCB Seminar, New Orleans, Louisiana, September 14-17, 1993. (with W.K. Ahlert, K.T. McLoughlin)

Environmental considerations for urban construction. Presented at 1992 ASCE National Conference, New York, New York, September 14-17, 1992. (with J.P. Lawler, and F.E. Matusky)

Cost effective accelerants for soil venting. Presented at 1991 AIChE National Conference, Los Angeles, California, November 17-22, 1991. (with T.B. Vanderbeek)

An examination of PCB detection limits in power plant wastewaters. Presented at the EPRI PCB Seminar in October, 1991. (with W.K. Ahlert, and R.M. Fritsch)

Preconstruction Activities: site investigation, identification of hazardous wastes, construction plans and qualifications, presented at Foundations Construction and Hazardous Wastes, a Deep Foundations Institute Specialty Conference, Newark, New Jersey, September 10-11, 1990

Planning Due Diligence Assessments. Presented at Environmental Due Diligence Course, Rochester and New York, NY, 1989, sponsored by New York Bar Association.

Pre-acquisition risk management and liability reduction options in real estate transactions. Presented at Edison Electric Institute's Environmental Auditing Forum on Specialty Audits, New Orleans, LA, October 19-20, 1988. (with K.A. Abood and S.E. Bassell)

Summary of PCB Spill Cleanup Practices. Presented at the Hazardous Waste and Hazardous Materials Conference, Las Vegas, Nevada, April 1988 (with K.A. Abood, D.F. Distante, and K. Konrad)

Testing of multiple hypotheses in groundwater monitoring programs, presented at "Groundwater Issues for the Electrical Utility Industry: Technology and Policy," February 11, 1988; sponsored by Edison Electric Institute Groundwater Task Force, Electric Power and Research Institute, Utility Solid Waste Activities Group, and Florida Power and Light Company. (with J.A. Clock, and A. Wells)

Impact assessment for hazardous waste discharges from power plants. American Society of Civil Engineers Energy Division Specialty Conference, Session No. E11, Atlantic City, NJ, April 28, 1987. (with J.P. Lawler and C.M. Logan)

Biological evaluation of angled screen test facility. In: Hydraulics and Hydrology in the Small Computer Age. Vol. 1. (W.R. Waldrop [ed.]). Proceedings of the Specialty Conference, American Society of Civil Engineers, Hydraulics Division P. 842-847. August 1985. (with J.A. Matousek, J.G. Holsapple and R.C. Roberts)

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Operational and biological effectiveness of an angled screen intake system. Presented at the Joint Power Generation Conference, Toronto, Canada, September 1984. (with S.J. Edwards, J.F. Dembeck, M.J. Skelly, and D. Rengert)

Protection of Lake Ontario fish at a power plant intake using angled screen diversion. Presented at the 1982 Great Lakes Conference, Sault Ste. Marie, Ontario, Canada, May 3-6, 1982. (with S.J. Edwards, J.F. Dembeck, and M.J. Skelly)

Impacts of sewers on surface and subsurface waters. Presented at the 1981 Annual Conference of the American Water Works Association, June 1981. (with R.A. Norris and T.B. Vanderbeek)

Some considerations toward benefitting from effluent and surface water-body monitoring programs. Presented at the Conference on "Benefiting from Environmental Monitoring." Sponsored by Geraghty and Miller, Inc., American Ecology Services, October 1979. (with J.P. Lawler, R.A. Alveras, D.T. Logan, and W.P. Stepien)

An observational and analytic study of coastal circulation. Doctoral Dissertation, New York University, School of Engineering and Science, 1977.

Hydraulic model simulations of winter and summer thermal plumes. Presented at the Second Midwestern Regional Meeting of the American Geophysical Union, October 1976. (with M.J. Skelly)

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Applicability of analytical solutions to stratified coastal currents. Presented at Offshore Technology Conference, May 1972.

A study of temperature and salinity changes along the northern New Jersey coast. New York University, TR 69-7. 1969

Oceanographic applications of radar altimetry from a spacecraft. Coauthor of Remotes Sensing of Environment, Vol. 1, 1967. (with J.A. Greenwood, A. Nathan, G. Neumann, W.J. Pierson, and F.C. Jackson)

Radar altimetry from a spacecraft and its potential applications to geodesy. Coauthor of Remote Sensing of Environment, Vol., 1967. (with J.A. Greenwood, A. Nathan, G. Neumann, W.J. Pierson, and F.C. Jackson)

Attachment B

LMS

Rockland County, New York:
One Blue Hill Plaza, 12th Floor
Pearl River, New York 10965
(845)735-8300 Phone
(845)735-7466 Fax

Orange County, New York:
7 Coates Drive, Suite #2
Goshen, New York 10924
(845) 294-2789 Phone
(845) 294-5893 Fax

Midwest:
10207 Lucas Road
Woodstock, Illinois 60098
(815)334-9511 Phone
(815)334-9515 Fax

Dutchess County, New York:
Hollowbrook Office Park
15 Myers Corners Road, Suite 2-J
Wappingers Falls, New York 12590
(845)297-0666 Phone
(845)297-3324 Fax

Pennsylvania:
The Sovereign Building
609 Hamilton Mall
Allentown, Pennsylvania 18101
(610)740-1010 Phone
(610)739-3737 Fax

Website: WWW.LMSENG.COM
Email: LMS@LMSENG.COM

Representative LMS Clients

INDUSTRY/DEVELOPERS

American Cyanamid Co.
American Home Foods, Inc.
American Petroleum Institute
Arcadian Corporation
AT&T Technologies
BP Exploration and Oil, Inc.
Barr Laboratories, Inc.
Battery Park City Authority
Big V Supermarkets, Inc.
Bristol-Myers Squibb Company
C.R. Bard, Inc.
Castle Oil Corporation
Ciba-Geigy Corporation
Cogen Technologies
Conoco, Inc.
Dyno Nobel Inc.
E.I. Du Pont de Nemours & Co., Inc.
ECDC Environmental, L.C.
Exide Corporation
Exxon Company, USA
Fisher Guide
Forest City Residential Development, Inc.
General Electric Co.
General Foods Corp.
General Motors Corp.
Georgia-Pacific Corp.
H.O. Penn Machinery
Harris Corporation
IBM Corp.
ICI Americas Inc.
International Paper Company
ITT Corp.
Lederle Laboratories
Lever Brothers Company
Lone Star Industries
MIC Technology Corporation
Materials Research Corporation
Millmaster Onyx Group
Morton Thiokol, Inc.
Nepera, Inc.
New York Trap Rock
Olympia & York
Pfizer Inc
Pizza Hut, Inc.
Ramapo Land Company
The Related Companies
Reynolds Metals Development Corp.
Sandoz Pharmaceuticals Corporation
Sony Corporation of America
Standard Brands, Inc.
Stauffer Chemical Co.
Sterling Forest Corporation
tesa tuck, inc. (TTI)
Tilcon New York, Inc.
Trump Organization
Unilever Research U.S., Inc.
Wakefern Food Corp.
Witco Corp.
York International Corp.

GOVERNMENT

Barbados, Government of
Bayonne (City of), NJ
Clarkstown (Town of), NY
Connecticut Dept. of Environmental Protection
Dormitory Authority (NY State)
Federal Emergency Management Agency
Georgia Dept. of Natural Resources
Glens Falls (City of), NY
Goshen (Village of), NY
Hoboken (City of), NJ
Hudson County Utilities Authority
Jersey City (City of), NJ
Long Island Regional Planning Board
Mahwah (Township of), NJ
Nassau County Dept. of Public Works
New Castle (Town of), NY
Newburgh (Town of), NY
N.J. Dept. of Environmental Protection
N.Y.C. Dept. of Environmental Protection
N.Y.C. Dept. of Sanitation
N.Y.S. Dept. of Environmental Conservation
N.Y.S. Dept. of Transportation
N.Y.S. Environmental Facilities Corp.
Norwalk (City of), CT
Orangetown (Town of), NY
Port Authority of NY & NJ
Rockland County, NY
Saratoga County Sewer District, NY
South Nyack (Village of), NY
Suffolk County, NY
U.S. Army Corps of Engineers
- Baltimore District
- New York District
- North Atlantic Division
- Omaha District
- Savannah District
- Waterways Experiment Station
- Wilmington District

U.S. Nuclear Regulatory Commission
U.S. Postal Service
Westport (Town of), CT
Yorktown (Town of), NY

LAW FIRMS

Beveridge & Diamond, Esq.
Birbrower, Montalbano, Condon & Frank, P.C.
Cadwalader, Wickersham & Taft
Foley & Lardner
Honigman, Miller, Schwartz & Cohn
Hunton & Williams
Kaye, Scholer, Fierman, Hays & Handler
Kelley Drye & Warren
Klett Lieber Rooney & Schorling
Morgan, Lewis & Bockius
Sive Paget & Riesel
Tallman Hudders & Sorrentino
Winston & Strawn
Whiteman, Osterman & Hanna

UTILITIES

Baltimore Gas & Electric
Carolina Power & Light Co.
Central Hudson Gas & Electric Corp.
Commonwealth Edison Co.
Consolidated Edison Co. of New York, Inc.
Consumers Power Company
Detroit Edison Co.
Edison Electric Institute
Electric Power Research Institute
Empire State Electric Energy Research Corp.
Florida Power Corporation
GPU Nuclear Corporation
Hartford Steam Company
Indiana Michigan Power Company (AEP)
Indianapolis Power & Light Company
Jersey Central Power & Light Company
Long Island Lighting Company
Metropolitan Edison Co.
Muscatine Power and Water
Narragansett Electric Company
New England Power Service Co.
New York Power Authority
New York State Electric & Gas Co.
New York State Public Service Commission
Niagara Mohawk Power Corp.
North Jersey District Water Supply Comm.
Northeast Utilities Service Co.
Omaha Public Power
Ontario Hydro
Orange and Rockland Utilities, Inc.
Potomac Electric Power Company
Public Service Electric & Gas Co.
Rochester Gas & Electric Co.
Southern California Edison Co.
Spring Valley Water Co.
Tampa Electric Co.
Texas Utilities Generating Co.
United Water

INTRAPROFESSIONAL

Bechtel Group Inc.
CDM Federal Programs Corporation
Dames & Moore
De Leuw, Cather & Company
Ebasco
Foster Wheeler Corporation
Gibbs & Hill, Inc.
Hazen and Sawyer
Metcalf & Eddy
O'Brien & Gere Engineers, Inc.
Parsons Brinckerhoff Quade & Douglas, Inc.
Roberts & Schaefer Company
Roy F. Weston, Inc.
Stone & Webster Engineering Corporation
URS Consultants Inc.
Vollmer Associates

REFERENCES

Geraghty & Miller, Inc. Availability of Ground-water Resources at the Croton-on-Hudson Well Field- Croton-on-Hudson, New York. Prepared for the Village of Croton-on-Hudson, New York. August 1988.

Geraghty & Miller, Inc. Aquifer Protection Plan- Croton-on-Hudson Well Field Croton-on-Hudson, New York. Prepared for the Village of Croton-on-Hudson, New York. January 1989.

New York State Department of Health. Revised Draft Source Water Assessment Croton-on-Hudson Village, System Number: NY5903425. Prepared by URS Corporation for the NYSDOH. November 26, 2002

New York Department of State. Reply Brief and Supporting Information and Data of the New York Department of State. Federal Consistency Appeal by Millennium Pipeline Company from an Objection by the New York Department of State. April 4, 2003

Village of Croton-on-Hudson. Memorandum from Village Engineer to Village Mayor and Board of Trustees regarding Millennium Pipeline Impacts to the Village Well Field, November 12, 2002. Supplemental Comments of the Villages of Croton-on-Hudson and Briarcliff Manor, New York. In the Federal Consistency Appeal of Millennium Pipeline Company, L.P., January 8, 2003.

LMS

Summary of LMS Services

field sampling – laboratory analyses – modeling – investigations – environmental impact assessment permitting – design – resident engineering – start-up/O&M/technology transfer expert witness & testimony – closure – postclosure – compliance management

Hazardous Waste Management

- site assessments
- remedial investigations/feasibility studies (RI/FSs)
- risk assessment
- bioremediation
- site closure/postclosure plans
- spill assessments
- remedial design/resident engineering
- brownfields (remedial development)
- contaminant investigations: coal, tar, PCBs, hydrocarbons, lead, etc.
- lead-based paint
- underground storage tanks - closure & testing

Regulatory Compliance

- environmental compliance management/reviews
- multimedia audits
- permit management - waste minimization, prevention
- permitting: CWA, CAA, RCRA, TSCA, CERCLA, SARA services
- expert witness & testimony

Air

- air quality monitoring
- compliance/permitting (Title V)
- modeling

Environmental Engineering

- water transmission/distribution
- water treatment
- sanitary, storm, combined sewers
- wastewater treatment
- remedial design
- treatability/process engineering
- site engineering (planning, land development)
- resident engineering, O&M/start-up
- municipal engineering
- CADD, GIS, GPS, mapping, surveying

Hydrogeology

- groundwater supply
- wellhead protection programs
- hydrogeological investigations/modeling
- groundwater quality investigations

Environmental Science

- field/laboratory investigations - aquatic, wildlife, vegetation
- aquatic/fisheries studies
- hydrographic, bathymetric, & sediment surveys
- wetlands delineation/mitigation
- terrestrial ecosystem studies
- environmental impact assessment & permitting, EIS/EAS
- resource management - natural resource damage (NRD)
- ecological risk assessment
- intake system assessment
- hydropower licensing
- mitigation plans
- threatened and endangered species
- dredging
- zebra mussels
- marine borer protection

Mathematical Modeling

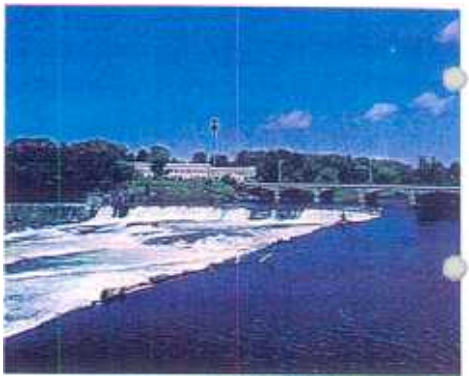
- water quality/quantity modeling
- hydrodynamics/hydraulics
- wasteload allocation
- toxic/fate & transport modeling
- groundwater modeling
- ecological & biological modeling
- database/software development
- water supply
- thermal modeling
- sediment transport modeling
- air quality modeling
- dilution & dye studies

PLANNING & ENGINEERING DESIGN

9-MGD activated sludge wastewater treatment plant

Preliminary facilities building, municipal wastewater treatment plant

Evaluation of use of Hudson River as a water supply source



Landfill closure conducted by LMS

Hazardous Waste Management 2

Regulatory Compliance 4

Environmental Investigations 6

Environmental Modeling & Analysis 8

Planning & Engineering Design 10

Summary of LMS Services 12

Mission Statement

The goals of Lawler, Matusky & Skelly Engineers LLP (LMS) are to provide total and integrated environmental engineering and science services to industry and government, to continually develop our capabilities in the environmental field, and to make a lasting contribution to the engineering and scientific professions and the communities in which we work.

Lawler, Matusky & Skelly Engineers LLP

LMS ambient air monitors

Field analysis of drum contents at a hazardous waste site

LMS direct-push soil and groundwater sampling rig

Split-spoon sample

Hazardous Waste Management

LMS provides effective and comprehensive consulting services using a multidisciplined team of scientists an engineers for all stages of hazardous waste management, from discovery through remediation and postclosur and compliance monitoring.

SITE SURVEYS

- Field sampling of water, soil/sediment, air, and biota
- Facility surveys and inspections
- Lead-based paint assessments
- Environmental assessments
- Remedial investigations
- Field screening and gas chromatograph (GC) analysis
- Magnetometer surveys
- Soil gas surveys
- Subsurface borings

BROWNFIELDS DEVELOPMENT

- Regulatory constraints
- Site screening
- Cleanup levels/costs
- Risk management strategies

GROUNDWATER INVESTIGATIONS

- Pump tests
- Sampling and monitoring
- Permeability/leachability testing
- Contaminant evaluation and plume predictions
- Groundwater resource development
- Fate and transport modeling

LABORATORY TESTING AND ANALYSIS

- Grain-size analysis
- Extract and elutriate analysis
- Waste treatability studies
- Subcontracted chemical analysis
- Mobile GC analysis

EVALUATION OF ALTERNATIVES

- Interim remedial measures
- Feasibility studies
- Waste classification
- Bioremediation
- Risk assessment
- Cost/benefit analysis
- Regulatory compliance

IMPLEMENTING THE SOLUTION

- Site closure and compliance monitori
- Wellhead protection programs
- Litigation support
- Public participation coordination
- Development of contaminated proper

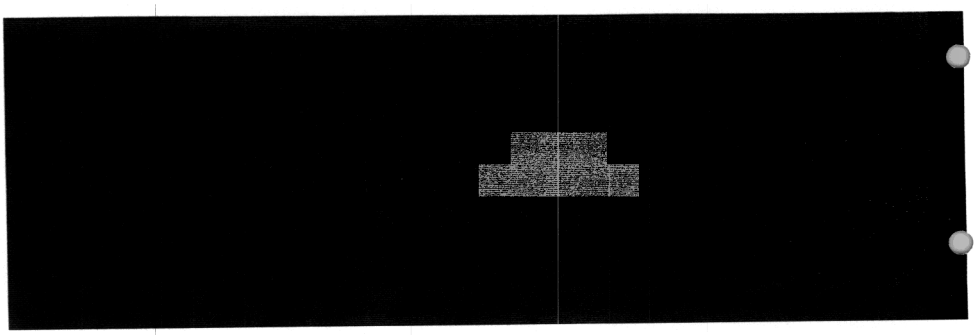
Meeting the Environmental Challenge

Since 1965 LMS has assisted industry and government in achieving demanding environmental goals cost effectively. Through our integrated environmental engineering and science consulting services, we have earned a reputation for excellence in pollution prevention, water supply, hazardous waste management, environmental impact and compliance, siting and permitting, and mathematical modeling.

What is the basis of this reputation? LMS offers a multidisciplinary staff trained in virtually every environmental discipline as well as in engineering, resident engineering, regulatory affairs, computer science, and data processing. Our partners and project managers are directly accessible and actively involved in all aspects of your project. We bring advanced computer technology and modeling capabilities, GIS, GPS, CADD, and comprehensive field and laboratory facilities to today's environmental challenges. Above all, we develop cost-effective solutions utilizing our experience and expertise.

At LMS we provide full capability and commitment, whether we are asked to execute all or part of a project. We work with our clients from concept and initial field investigation through data analysis, design, environmental impact assessment, permitting, and assistance in construction and operation.

We invite you to review this brochure and see how we've helped clients achieve their environmental goals – and how we can help you meet yours. We encourage you to explore our capabilities with us and see how we can develop a realistic, cost-effective solution to your environmental problems.



LMS designed and prepared permit application for air stripper to meet regulatory requirements

Stormwater/combined sewer overflow compliance management

Application for Title V Operating Permit

Regulatory Compliance

LMS' goal is to provide fully informed and experienced support to clients designed to evaluate and maintain effective and efficient compliance with environmental regulatory requirements.

LMS provides regulatory compliance support services across all media and programs. Regulatory specialists and scientific experts are cross trained and experienced in the application of complex regulations to real-world operations.

LMS' long history of involvement with regulatory compliance has established a highly regarded reputation for professionalism with both our clients and Federal, state, and local regulatory agencies. LMS also works closely with client legal counsel on sensitive and confidential issues and litigation support.

MULTIMEDIA

- Audits/compliance inspection
- Pollution prevention
- Waste minimization
- Coordinated permit negotiation
- Environmental benefits strategy
- Computerized management information systems

AIR

- State and Federal permits (Title V)
- Emissions investigations
- Compliance analyses (RACT, MACT)
- Modeling and risk analyses
- Control technology
- Accidental release plans

WATER

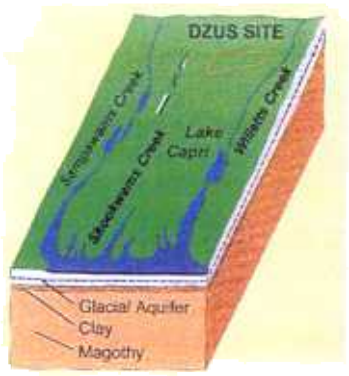
- NPDES/SPDES permitting
- Discharge impact assessments
- Intake impact assessments
- Water quality modeling
- Sampling and analyses
- Toxicity evaluations

HAZARDOUS/SOLID WASTE

- RCRA and solid waste permits
- Regulatory compliance analyses
- Waste minimization
- SARA Title III reporting
- Waste characterization

HAZARDOUS WASTE MANAGEMENT

3-D groundwater model printout



LMS project team develops remedial alternatives

LMS inspects removal of two 6000-gal petroleum USTs

CONTAMINANTS	FACILITIES
Solvents	Land disposal sites
Petroleum	Well fields
Gasoline	Manufacturing facilities
Metals	Wastewater treatment facilities
Caustics	Storage facilities
Acids	Spill sites
Trihalomethanes	Underground storage tanks
PCBs	Development properties
Dioxins	Right-of-ways
Pesticides	
Explosives	
Ignitable wastes	

Field investigation of industrial site with complex infrastructure

Collecting fish samples from LMS research vessel *Heather M II*

Water quality sampling in urban estuaries

Evaluation of a silt curtain to mitigate the impacts of dredging

Environmental Investigations

LMS' environmental assessments and impact analyses are structured to streamline the environmental review and permitting process so your projects advance as quickly and as economically possible.

Our ecological risk assessments are designed to discriminate between real and perceived risks so that cost-effective remediation, mitigation, and restoration plans are implemented.

LMS has successfully completed thousands of environmental assessment and impact projects that have included design of field investigations, sampling and laboratory analysis, data analysis, ecological and human health risk assessment, preparation of impact statements, preparation of permit applications, expert testimony, and negotiations with regulatory agencies.

LMS offers expertise in the following specialty areas:

- Wetland delineation, design, and mitigation
- Threatened and endangered species evaluation
- Wildlife and vegetation studies
- Significant habitat evaluation
- Natural resource damage assessment
- Fabrication of innovative sampling gear
- Dredging- and fill-related permits and investigations
- Waterfront development permits and impacts
- Design and execution of sampling at major industrial facilities and power plants
- Instream flow incremental methodology (IFIM)
- Habitat evaluation procedures (HEP)
- Wetland evaluation techniques (WET)
- Ecological risk assessment
- Marine borer protection
- Environmental impact analyses and permitting
- Mitigation plans
- Hydropower licensing
- Field collection, taxonomic identification, and analysis of fish, benthos, and plankton
- Sampling and analysis of water, sediment, and tissue chemistry

REGULATORY COMPLIANCE

Labeling of sample as part of chain-of-custody protocol

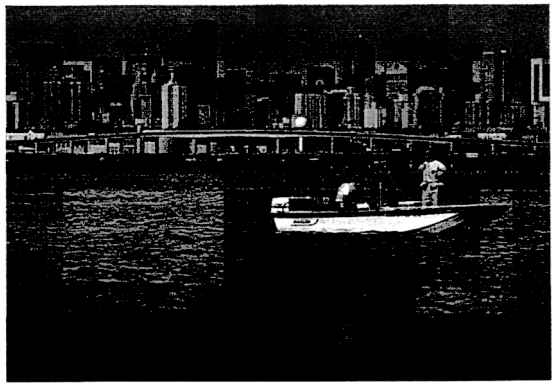
HNU monitoring of soil taken from pit by backhoe

Injection of dye into water pollution control plant effluent for tracer dilution studies

Multimedia environmental management strategies

LMS modeling team overview session

LMS field crew collecting data for water quality model



Graphic display of thermal model results

Environmental Modeling & Analysis

LMS provides quantitative answers to complex questions about the environment through the use of mathematical models and database management systems. We have nationally recognized capabilities in the development and application of realistic and defensible models of environmental systems and in the design of sampling programs to provide the data required to calibrate and verify these models.

LMS uses modern computer technology to develop interactive models designed to simplify the decision-making process and respond to "what-if" questions quickly. Using sophisticated graphical techniques and customized software, LMS provides dynamic, animated depictions of the results of complex models, such as three-dimensional, real-time transport models, in a continuous color display.

LMS develops mathematical models in these areas:

- Hydrology, hydraulics, and hydrodynamics
- Water quality
- Water quantity
- Combined sewer overflow and stormwater runoff
- Contaminant fate and transport
- Surface and groundwater plumes
- Dilution studies
- Thermal discharges
- Sediment transport
- Biological systems
- Fish populations
- Air quality
- Water distribution
- Wastewater collection
- Land-based (SWMM) modeling

These models have been applied to diversity of environmental projects, including:

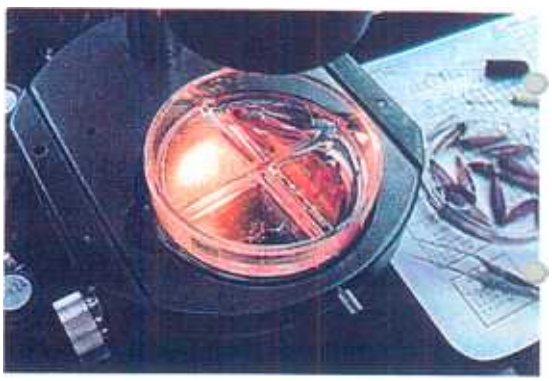
- Environmental impact statements
- Flooding studies
- Water quality criteria compliance
- Wasteload allocation and NPDES permi limitations
- Water supply yield
- Facilities planning
- Water withdrawal impacts
- Power plant licensing
- Dredging and fill permitting
- Sediment criteria compliance
- Impacts of waterfront development
- Thermal impact demonstration studies
- Risk assessment
- Acute/chronic toxicity and mixing zones
- Industrial compliance tracking
- Cost/benefit analysis
- Watershed management

ENVIRONMENTAL INVESTIGATIONS

Collecting amphibians for a study of wetland functions

One of the peregrine falcons studied in an endangered species evaluation

Analytical laboratory setup showing larvae and egg sorting and identification



LMS crew conducting winter entrainment sampling at hydroelectric power plant

Innovative flotation/filtration clarification of trickling filter effluent, 24-MGD wastewater treatment plant

Aeration tank showing incremental weirs

Municipal/industrial packed tower wastewater treatment plant

Planning & Engineering Design

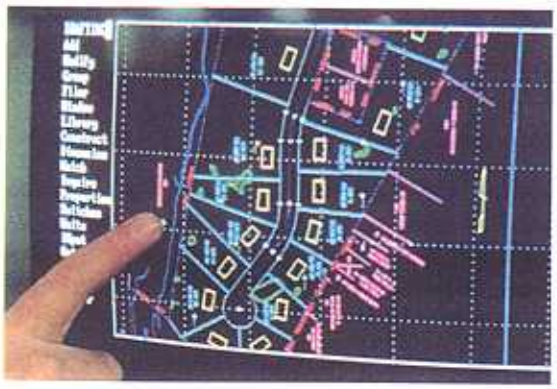
LMS offers a comprehensive range of services to conceptualize and implement engineering projects in the water, wastewater, air pollution control, and land development areas. These services are offered to both public and private clients.

- Facilities plans
- Infiltration/inflow studies
- Sewer system evaluation studies
- Sewer system and pump station design
- Bench- and pilot-scale treatability studies: municipal, industrial, and groundwater
- Water and wastewater treatment plant design
- Land development, site planning, and engineering
- Air pollution control
- Computer-aided design and drafting (CADD) services
- Global positioning system (GPS)/ geographical information system (GIS)
- Resident engineering
- O&M manual preparation
- Treatment plant start-up and operation
- Groundwater and contaminated site remediation
- Landfill closure
- Water treatment sludge handling
- Water distribution systems
- Drainage design
- Trenchless technology

Regenerative thermal oxidizer for VOC emission reduction, in use at a laminator plant

ENVIRONMENTAL MODELING & ANALYSIS

LMS' modeling and GIS capabilities provide state-of-the-art technology for CSO control



Project team works with LMS water supply management systems interactive program

Study area for East River CSO modeling project