Timothy J. Mayotte, Ph.D., CPG, CP, P.E.
1130 Hitching Post Road
East Lansing, Michigan 48823
Phone: (517) 367-2674
Email: tjm@mayottedesign.com

EDUCATION

Doctor of Philosophy, Environmental Engineering, Michigan State University
Master of Science, Environmental Engineering, Michigan State University
Master of Science, Geology (Hydrogeology), Western Michigan University
Bachelor of Science, Geology (Geophysics Option), Michigan State University

CERTIFICATIONS

Registered Professional Engineer:
Illinois (Lic. No. 062-050511)
Indiana (Lic. No. PE19600532)
Michigan (Lic. No. 41981)
Ohio (Lic. No. E-60381)
Wisconsin (Lic. No. 31738)
Certified Professional Geologist (AIPG CPG No. 9457)
Michigan Qualified Underground Storage Tank Professional (CP No. 619)

AFFILIATIONS

American Society of Civil Engineers
American Society of Microbiology
American Institute of Professional Geologists

PROFESSIONAL EXPERIENCE

Mayotte Design & Engineering, P.C. (2002 – present)
East Lansing, Michigan
Owner/President
Dr. Mayotte founded MD&E in 2002. MD&E provides broad range of engineering services to industrial and commercial clients across the US. Active projects include: design-build and operation and maintenance of groundwater circulation and bioaugmentation delivery systems for treatment of chlorinated solvents at active industrial facilities; engineering modification of industrial wastewater treatment processes; hydrodynamic and solute transport modeling; characterization and remediation of environmental impacts associated with solvent releases; management of RCRA closure activities; brownfield redevelopment; water supply and development; and litigation support/expert witness testimony.

Lansing Community College
Lansing, Michigan
Adjunct Faculty, Science Department
Dr. Mayotte regularly teaches multiple sections of medical microbiology, microbiology laboratory and physical science courses at LCC. Microbiology topics include prokaryotic cell physiology, genetics, virology, and innate and adaptive immunity in higher order organisms. Physical science subjects include: basic chemistry; physics; energy, water and nutrient cycling in natural systems; geology; hydrology; and meteorology.

MWH Americas, Inc. (formerly Montgomery Watson/Harza) (2003)
Novi, Michigan
Principal Engineer
Dr. Mayotte was responsible for technology innovation and application for MWH remediation projects world-wide. He was also responsible for the development and management of engineering staff and services for the Detroit office industrial practice.

Northern Technologies, Inc.
(under research contract with Michigan State University) (2000 – 2003)
East Lansing, Michigan
Technical Director - Engineering
Dr. Mayotte participated in multi-disciplinary research funded by the State of Michigan. These studies focused on developing biostimulation and bioaugmentation strategies for in-situ remediation of plumes of groundwater contamination consisting of mixtures of chlorinated solvents and heavy metals. The research, conducted in collaboration with investigators from the Civil and Environmental Engineering Department at Michigan State University, Stanford University, and the National Science Foundation's Center for Microbial Ecology, also focused on improving the understanding of factors affecting microbial kinetics in the subsurface.

Golder Associates – US Operations (1994 – 2000)
Lansing and Dearborn, Michigan
Manager of Michigan Operations
Dr. Mayotte founded and was responsible for the technical and administrative management of Golder's Michigan Operations and sponsorship of industrial clientele. Project-level responsibilities included: evaluation and design of industrial wastewater treatment programs; management and execution of waste minimization studies; regulatory compliance audits; facility decommissioning and demolition projects; due diligence efforts; remedial investigations/feasibility studies; and remedial design and remedy implementation under CERCLA and Part 201 of Michigan Act No. 451. After opening as sole proprietor in the summer of 1994, the Michigan Operation grew to a staff of 28 engineers and scientists in two offices (Lansing and Dearborn) and consistently returned a net income in excess of 15% of fees during 1996-1999.

Brown & Root (formerly NUS Corporation) (1986 – 1994)
Lansing and Holt, Michigan
District Manager
Dr. Mayotte managed the Brown & Root, Michigan District Office (MDO), including: supervision of 18 professional and clerical staff members. He served as Project Manager, Principle Engineer and/or Hydrogeologist for commercial remedial design projects, and for remedial investigations/feasibility studies conducted pursuant to Michigan Act 307 and CERCLA/SARA. Performed groundwater flow and contaminant transport modeling for scoping investigations, risk assessments, and remedial design conceptualization and evaluation utilizing numerical codes such a MODFLOW, PLASM, RANDOM WALK, USGS-MOC, SUTRA, MT-3D, PATH3D, FLOWPATH, and various analytical solutions.

Program Manager and Group Supervisor
Prior to the fall of 1991, Dr. Mayotte managed six staff members comprising the Geotechnical Group of the BRE, MDO. Served as Program Manager for evolving commercial contracts with General Motors and Amoco Oil Company. Received the Amoco Detroit District Contractor of the Year Award for services rendered during 1990 and 1991.

SELECT EXAMPLES OF PROJECT EXPERIENCE

Facility Decommissioning and Wastewater Permit Close-Out
Textile Plant, Anaheim, California
Dr. Mayotte developed water budgets and mass balances to optimize process water consumption and reduce wastewater discharges to the Orange County Sanitation District under an industrial use permit. Later, he developed and coordinated a closure program to evaluate impacts to soil and groundwater by plant operations and to decommission the wastewater treatment and discharge system at the facility. This included obtaining a variety of environmental samples for waste-characterization analyses to verify compliance with local and state permit requirements.

In-Situ Bioenhancement Design and Build
Paint Processing Facility, Santa Ana, California
MD&E is assisting a multi-national home products manufacturer with the voluntary remediation of soil and groundwater impacted by chlorinated solvents at a paint formulation facility in southern California. MD&E provides specialized technical knowledge for implementation of an in-situ biological treatment strategy involving the injection of a carbon source that releases hydrogen upon fermentation. The resulting increase in hydrogen will serve to stimulate the activity of native soil microorganisms that are capable of dechlorinating (breaking-down) the target solvents. A dechlorinating enrichment culture of microorganisms may also be added to the impacted sediments to augment the native microbial population and accelerate the treatment process. MD&E has completed full-scale design and construction of the strategy, which entails a groundwater containment and recirculation system covering an area of over 50 acres including distribution of nutrient and inoculum-amended groundwater beneath the floor of the active manufacturing plant.

Expert Witness, Redevelopment of a former Coal-Fired Power Plant Site, Northern Michigan
Dr. Mayotte provided litigation support and served as the expert witness in a case involving redevelopment of a former coal-fired power plant in Advance, Michigan. Dr. Mayotte provided evaluations of and opinions regarding the leaching and environmental fate of heavy metals from coal-combustion byproducts stored in ash ponds, spread over large area of the facility grounds, and buried in a stormwater retention berm adjacent to Lake Charlevoix.

Dual-Phase Extraction Design and Implementation, Caledonia, New York
MD&E is engaged in implementation of a dual-phase extraction design and build project in up-state New York. The DPE system is intended to simultaneously extract solvent impacted soil vapors and groundwater adjacent to an active lithographic printing operation. The extracted media is treated by activated carbon before release into the atmosphere (vapors) and nearby receiving waters (groundwater).

Wastewater Engineering, Pratt and Whitney facility, Midwest
MD&E has been contracted by a major aerospace company to design and implement modifications to their in-plant wastewater treatment processes. This includes: selection and installation of automated process control devices; chemical metering pumps; and gauging appurtenances to improve the efficiency and safety of the neutralization of spent anodizing rinse water.

Delisting of Industrial Facility, Mason, Michigan
MD&E assisted a mid-Michigan manufacturing concern by developing a strategy and petition to remove their facility from the State of Michigan list of hazardous waste sites. Issues included verification of former wastewater management practices and potential impacts on sensitive ecological receptors, including stream and wetland environments. The strategy was successfully implemented, resulting in the complete delisting of the facility in the fall of 2006.

Remedial Investigation/Engineering Feasibility Study
Midwest Utility Company
MD&E is co-managing a multi-task study of the distribution of heavy metals and synthetic organic compounds in soil and groundwater reportedly associated with leachate from a 50-acre closed landfill. The subject landfill contains coal combustion by-products (CCBs), including fly ash, bottom ash and boiler slag from electric power generation facilities in central Michigan. Approximately 450,000 tons of CCBs were placed in the landfill. The objectives of the study are to: refine the current understanding of the waste characteristics and associated environmental impacts; facilitate an accurate assessment of risks posed by the facility to public health or the environment; and develop strategies to mitigate these risks, consistent with applicable federal and Michigan laws and regulations. The project also includes evaluation of conditions associated with munitions manufacturing performed on the site during the World War II era.

Numerical Modeling by Telescoping Mesh Refinement
Great Salt Lake Basin, Utah
MD&E developed a series of basin- and local-scale models to simulate hydrodynamics within shallow (near surface) sediments in the northeast quadrant of the Great Salt Lake Basin. The purpose of the modeling efforts was to evaluate a variety of natural and anthropogenic factors controlling groundwater flow and contaminant transport patterns near a chemical plant in Salt lake City, Utah. The models area also being used to aid the design and engineering of in-situ treatment processes to address site impacts.

Groundwater Characterization/Remediation
Former Automotive Components Facility, Southfield, Michigan
MD&E is investigating the magnitude and distribution of, and developing remedial strategies for, soil and groundwater impacted with chlorinated solvents at a former automobile parts fabrication facility in Southfield, Michigan. These impacts are associated with a release from a leaking underground storage tank system (LUST). Work entails: the acquisition and analyses of environmental samples; reduction and interpretation of analytical data for delineation of the impacted media; reporting consistent with the rules associated with Part 213 of

Michigan PA 451, the Natural Resources and Environmental Protection Act; the design and implementation of management and engineering alternatives for treatment of soil and groundwater; and documentation of site closure. Remedial processes currently under consideration include: source abatement/control by in-situ physicochemical or biological treatment, and groundwater plume management through Monitored Natural Attenuation.

Brownfield Redevelopment
Former Metal Finishing and Annealing Facility, Northwest Ohio
MD&E is leading the closure of a 100-year old manufacturing facility in northwest Ohio for a multi-national chemical company. The effort has entailed the detailed characterization of a facility that performed heat treatment of metal components for the automobile industry over much of its history. Currently, work performed by MD&E is focused on the removal and characterization of environmental impacts associated with a subgrade cistern that was used to store sodium cyanide solutions used in the thermal treatment processes. MD&E is directly responsible for coordinating the planning and execution of these activities with the Ohio EPA. MD&E is also spearheading efforts to secure funding for reclamation of the facility under the Clean Ohio Fund.

RCRA Closure
Former Metal Finishing and Annealing Facility, Northwest Ohio
MD&E is leading the closure of a 100-year old decommissioned manufacturing facility in northwest Ohio for a multi-national chemical company. The effort has entailed the detailed characterization of a facility that performed heat treatment of metal components for the automobile industry over much of its history. Currently, work performed by MD&E is focused on the removal and characterization of environmental impacts associated with a subgrade cistern that was used to store sodium cyanide solutions used in the thermal treatment processes. MD&E is directly responsible for coordinating the planning and execution of these activities with the Ohio EPA.

Remediation of Chlorinated Solvents, Trucking Terminal, Kalamazoo
MD&E is performing site characterization activities and developing and stewarding closure strategies for a site in southwestern Michigan with soil and groundwater impacts comprised of chlorinated solvents, including PCE, TCE and carbon tetrachloride. A multi-national pharmaceutical company acquired the property through a corporate acquisition and is proactively addressing the site consistent with Part 201 of the Michigan Natural Resources and Environmental Protection Act, PA 451 of 1994, as amended. MD&E has been contracted by Novartis to pursue a closure strategy that emphasizes compliance with due care responsibilities and low-cost management of off-site residual impacts.

Peer Review/Remedial Consultation – Multiple Automotive OEM Sites
MD&E provides peer review services for and technical input to soil and groundwater remediation projects managed by independent engineering consulting firms for automotive original equipment manufacturers (OEMs), such as General Motors and Ford Motor Company. Services typically include review of environmental and geotechnical characterization reports and the development

and evaluation of strategies to mitigate or manage risks posed to public and environmental receptors by impacted media.

Brownfield Redevelopment
Former Printing Facility, Howell, Michigan
MD&E is providing technical expertise and serving as a regulatory liaison for Burkhart Investment, LLC supporting redevelopment of a brownfield facility near Howell, Michigan. MD&E is working with a local unit of government to facilitate establishing a Brownfield Redevelopment Authority and Brownfield Plan to access financial incentives available to non-liable property owners through Michigan PA 381, including tax increment financing and a single business tax credit, to defray costs associated with characterizing and managing contaminated soil and/or groundwater at the facility. MD&E is providing the technical input regarding due care responsibilities, facility characterization, and environmental response actions necessary to address soil and groundwater impacted with chlorinated solvents and toxic metals.

In-Situ Bioremediation of Chlorinated Solvents
and Hexavalent Chromium
MD&E is supporting Michigan State University through input regarding the hydrodynamics and fate and transport of chlorinated solvents and hexavalent chromium within the aquifer system in the vicinity of Schoolcraft, Michigan. Dr. Mayotte provides insight from over 18 years of experience with investigating the sources and delineation of multiple plumes of groundwater contamination specific to the Schoolcraft area. Activities include participation in the conceptualization and execution of numerical models to estimate the magnitude of vertical hydraulic communication of adjacent strata in response to inoculate and substrate delivery schemes, and the fate of hexavalent chromium under a range of redox conditions.

SPCC Planning and Certification
Automotive Parts Manufacturing Plant, Auburn Hills, Michigan
MD&E certified a Spill Prevention Control and Countermeasures (SPCC) Plan for an automotive components manufacturing facility in Auburn Hills, Michigan. The facility consists of 110,000 square feet of manufacturing floor space. Approximately 12,500 gallons of hydraulic, rubber assembly, way, and heating oils are stored, or contained in process equipment in the complex, which is positioned within 500 feet of a tributary to Lake St. Clair of the Great Lakes waterway.

Acquisition Due Diligence – Lithographic Printing Operations
MD&E completed environmental due diligence at eight lithographic printing operations to facilitate the acquisition of an Ohio-based national printing company by a major business forms printing organization based in Dallas. The facilities evaluated included operations in New Jersey, Massachusetts, Ohio, Illinois, Missouri, Texas and California. MD&E is responsible for the timely transition of all environmental permits for these plants.

Merger Support
Textile Industry, Anaheim, California
MD&E provided engineering expertise to Ennis Corp. to support their merger with AlStyle Apparel, a multi-national sportswear manufacturer. MD&E performed an inspection of the AlStyle manufacturing and distribution operations in Anaheim, California to assess compliance with applicable federal, state and local environmental and occupational health and safety regulations. Processes examined included fabric knitting, set making, dyeing, finishing, cutting and sewing operations distributed over 500,000 ft2 of manufacturing floor space. Warehousing and distribution facilities occupying over 400,000 ft2 were also examined. Water use in dyeing operations consumes over 1,500 gpm. Wastewater treatment and selective catalytic reduction of boiler emissions is on-going at the main fabrication facility.

Storage Tank Closures
Former Metals Fabrication/Finishing Plant
MD&E is coordinating the assessment and closure of five underground storage tanks at a vacant manufacturing facility in northwest Ohio. Tier I and II Closure Assessments are being conducted at the site pursuant to the requirements of the Bureau of Underground Storage Tank Regulation (BUSTR). The target UST systems are suspected to be over 50 years old.

Compliance Assistance – Multiple Facilities Nationwide
MD&E is coordinating the transition of permits for and certification of compliance at multiple printing operations distributed across the continental US. Permit compliance issues include Title V CAAPP Program Annual Emissions Reporting, pressure vessel integrity, and regulated waste management and tracking under RCRA and various state hazardous waste management programs.

Bioaugmentation Research, Schoolcraft, Michigan
Participated in research focused on evaluating the migration characteristics and enhancing the growth of certain microbial strains in aquifer systems to promote in-situ biotransformation of carbon tetrachloride. The research was part of a multi-university (MSU and the University of Michigan) study to improve the effectiveness and implementability of controlled bioaugmentation for remediating large-scale and multi-contaminant complex aquifer contamination problems. Participation involved bench and field-scale research to evaluate microbial viability and transformation capacities under site-specific conditions. Served as a member of the research design team.

Remedial Design, GM-Powertrain, Flint, Michigan
Project Manager and Principal Engineer for the design of a multi-stage water treatment system to remediate groundwater impacted by coolants and hydraulic fluids containing PCBs. 24-hr pump testing, groundwater flow and contaminant transport modeling, and bench and pilot-scale testing were performed to optimize the design of a collection and treatment configuration consisting of emulsion breaking, advanced oxidation (UV/photolysis), oxidation/cosolvency/precipitation, granular activated carbon, and air stripping.

Industrial Pollution Prevention, Hayes Lemmerz International, Howell, Michigan
Conceived and executed a pollution prevention and water management study for an aluminum auto parts fabricating facility. Evaluated a series of manufacturing processes and formulated recommendations for enhancing water and energy use and minimizing wastewater production and treatment.

Facility Decommissioning/Demolition, Ford Motor Company, California and Michigan
Conducted and supervised survey activities and regulated materials inventory for the demolition of multiple facilities owned by Ford Motor Company. Developed specifications, in CSI format, to direct site decommissioning and demolition activities, including, but not limited to, asbestos and lead abatement and PCB removal. Monitoring of site activities is performed to confirm materials are handled and removed in accordance with applicable regulations.

Compliance Audit, Delphi Automotive, Flint, Michigan
Performed a comprehensive audit of the regulatory compliance status of a 2,500,000 ft^2, multi-process manufacturing facility. The audit focused on both environmental and health and safety issues, and was conducted concurrent with phase I and II environmental assessment activities at the facility.

Subtitle D Facility Groundwater Monitoring and Statistical Analysis, Bucyrus, Ohio
Managed a groundwater detection-monitoring program for a solid waste management facility owned and operated by a County in Central Ohio. The program included performing semi-annual and verification sampling activities and the statistical analysis of groundwater quality data, as required by rules promulgated under the Ohio Solid Waste Management Act.

SITE Demonstration, Electro Voice, Inc., Buchanan, Michigan
Project Manager and technical advisor for an in-situ bioremediation project performed for a major audio equipment manufacturer in cooperation with the Risk Reduction and Engineering Laboratory of the United States Environmental Protection Agency (EPA). The biorestoration design involved the delivery of appropriate terminal electron acceptors and nutrients to unsaturated soils and buried sludge contaminated with chlorinated aliphatic hydrocarbons. The EPA evaluated the design and implementation of the technology during the initial year of operation under the Superfund Innovative Technology Evaluation (SITE) program. Responsible for the design, construction, and operation and maintenance of the demonstration system, as well as the development of technology assessment procedures to ensure optimum performance of the bioenhancement process. To facilitate prompt and accurate evaluation of the effects of system manipulations, developed and supervised an in-house biological treatability testing laboratory.

Design of Closed-Loop Bioremediation System
Kalamazoo County, Michigan
Designed and constructed groundwater collection, ex-situ chemical and biological mixing and delivery systems, and a multi-level groundwater monitoring network for a novel in-situ bioaugmentation process to remediate chlorinated aliphatic hydrocarbons. Reactor system design included specifications for and fabrication of specialized tankage and mixing devices, chemically-compatible plumbing and piping systems, groundwater collection and inoculum, nutrient and substrate delivery pumps, and an integrated power control unit and switching mechanisms. The multi-level groundwater monitoring system (e.g., dialysis cells) promotes passive acquisition of subsurface geochemical and microbial data. An objective of the design was to develop a prototype for a modular system that can be constructed quickly and economically, and will require minimal operational control. Recent developments include installation of vertically-injected barrier walls for creation of funnel and gate reactor cells and injection of permeable, timed-released substrate material for enhancing the in-situ biological processes. Performed groundwater modeling to assess hydrodynamics created by funnel walls.

Landfill Dike Investigation and Feasibility Study
Wayne County, Michigan
Managed a subsurface investigation to verify the existence and construction specifications of the cutoff wall and underdrain system at a landfill in southeastern Michigan. In addition, reviewed and evaluated data and information produced by other investigators to assess the potential for past, current, or future releases of leachate from the landfill into adjacent groundwater, and to examine options for the control of leachate head levels within the facility. The results of the subsurface investigation were used to develop design assumptions for repair of the cutoff wall and facilitate a feasibility analysis focused on evaluating the efficacy of various options that may be implemented to accomplish the repairs, including natural clay dike construction, slurry wall, jet-grouting, soil saw, sheet piling, geomembrane curtains, and several groundwater and leachate level control procedures.

Client Sponsor, Whirlpool Corporation
Served as Golder's Sponsor and Program Manager for their Master Services Agreement with Whirlpool Corporation. Projects included due diligence activities and environmental contamination investigations and remediation efforts conducted throughout North and South America, Asia and Europe.

Industrial Treatment Sludge Management, Bristol-Meyers
Zeeland, Michigan
Developed a solid waste management plan for a food processing wastewater treatment facility in western Michigan. The plan specified procedures for the management of waste-treatment residuals through the application of sludge to agricultural fields.

Treatment System Design, GM – Powertrain, Flint, Michigan
Developed and coordinated the execution of an experimental plan for the bench-scale evaluation of activated carbon (both powdered and granular forms) for removing PCBs from groundwater recovered at an aged automotive parts fabrication plant. The tests were to provide sufficient data to facilitate modeling of adsorption processes in various reactor configurations to optimize the design of the full-scale treatment system. The conceptual design developed included oil-water separation by acidification and coalescing filtration, particulate filtration using a continuous feed, self-cleaning, sand filter, and carbon adsorption in two, series staged, back-washable and disposable GAC columns.

Expert Witness Testimony, Kalamazoo County, Michigan
For four years, served as an expert witness for the Michigan Attorney's General Office in support of litigation undertaken in response to enforcement actions. Testified in depositions and court regarding contaminant fate and transport issues and groundwater remediation activities. Most recently, performed contaminant fate and transport modeling activities to assess proposed cleanup durations, and examined and provided consultation to client regarding the efficacy of treatment alternatives to remediate hexavalent chromium, arsenic, and chlorinated solvents in groundwater. Efforts included providing comment on and options for bench and pilot-scale evaluation of chemical fixation procedures, and air sparging.

Program Manager, Amoco Oil Company sites across Upper US
Served as Program Manager for a multi-site, leaking underground storage tank (LUST) management contract with Amoco Oil Company. Responsible for technical oversight and quality assurance of site assessments, hydrogeologic investigations, tank removals, and remedial activities associated with over 30 LUST sites. Proposed and supervised the development of management plans for several districts of Amoco nationwide whereby liability risks associated with over 300 facilities were identified and prioritized. Coordinated manpower and maintained administrative efficiency within the program, which included approximately $1,200,000 in awards.

Quality Coordinator, Canadian National (CN) Railroad
Served as Central Quality Coordinator for Golder's Master Services Agreement with Canadian National Railroad. During 1997 alone, Golder staff under Dr. Mayotte's direction completed 67 Phase I Environmental Site Assessments (ESAs) and 54 Phase II ESAs for properties within Illinois, Indiana, Ohio, Michigan, Vermont, and Connecticut. Since 1997, Golder also completed facility inventories and asbestos surveys within abandoned rail yard buildings in Michigan. Also managed full-scale facility decommissioning/demolition efforts and implemented soil and groundwater remediation activities at CN sites across the US. Performed site assessment and drainage studies at major rail yard and intermodal facility in Memphis, Tennessee.

Compliance Audit Program Coordinator, Ford Dealerships across US
Designed and managed a program to perform compliance audits at dealership facilities owned in part by a major automobile manufacturer. A total of 175

dealerships throughout the contiguous United States participate in the audit program. Dr. Mayotte was responsible for developing the audit protocol for the participating dealerships and for reviewing work product produced during implementation of the program.

CERCLA Landfill Closure, Kalamazoo, Michigan
Project Manager for a CERCLA-driven remedial design for the closure of a landfill in Kalamazoo, Michigan. Project elements included: additional pre-design studies to characterize the hydrodynamics and contaminant distributions in affected aquifer systems; design of a hazardous waste cap consistent with the requirements Michigan Natural Resources and Environmental Protection Act No. 451, Part 111; design of a groundwater collection and treatment system; and representation of the PRP group during meetings with the U.S. EPA and Michigan Department of Environmental Quality.

In-Situ Redox Manipulation Treatability Testing and Design
Manistee, Michigan
Designed and executed a four-phase laboratory study to assess the efficacy of and develop design specifications for an in-situ redox manipulation strategy to reduce hexavalent chromium in vadose zone soils to less soluble and less toxic trivalent forms. The chromium contamination resulted from a lengthy history of plating operations at a facility located in close proximity to the Manistee River in western Michigan. The lab tests entailed the simulation of in situ redox manipulation in a series of columns packed with impacted site soil. In-situ oxidation-reduction potentials were altered using sulfur-based reagents mixed in measured quantities with site groundwater. Reductant-amended solutions were delivered to the soil columns in such a way as to simulate periodic infiltration through the unsaturated soils at the site. Reductant loadings and frequencies have been prescribed for the removal by fixation of an optimal mass of chromium per reducing equivalent and delivery volume.

EH&S Compliance Evaluations, GE/NBC, Los Angeles, Boston, Newark
Participated in multi-site environmental, health and safety compliance evaluation program to support the acquisition of Universal Studios by General Electric/NBC. Efforts required the inspection and evaluation of site conditions and operations at network studios, film storage facilities and motion picture studios and adventure/theme park.

State-Funded Remedial Investigations/Feasibility Studies/ Remedial Design

Schoolcraft, Michigan
Served as Project Manager for a remedial investigation/feasibility study aimed at identifying parties responsible for multiple groundwater contamination plumes (organic and inorganic) affecting a prolific, unconfined, glacial outwash aquifer in a small town in southwestern Michigan. Contaminants included wastes from: processes associated with an automotive component manufacturing facility; a wood treatment and preservation plant; and a grain storage and distribution operation. Was responsible for the development of all project deliverables, and conducting and supervising data acquisition efforts. Supervised the development and evaluation of remedial alternatives identified as applicable to the waste matrices at the site. Developed remedial action plans for selected remedies. Represented the State of Michigan in public meetings and in legal support activities for the Michigan Attorney General's Office. Project budget was $1,050,000.

Richland, Michigan
Project Manager for a remedial investigation/feasibility study of soil and groundwater contamination resulting from plastic fabrication and plating practices, and discharges of process materials to unlined lagoons. During the scoping of the study, a comprehensive review of chemical inventories and the manufacturing process utilized by the PRP led to the identification of several contaminants and source areas previously unknown. Project Involved

modeling of the affected hydrogeologic environment (layered aquifer systems) to evaluate impacts of hexavalent chromium, nickel, halogenated and non-halogenated aliphatic hydrocarbons and various acids on the aquifer systems, and to evaluate the implementability of various remedial alternatives. Project budget was $1,300,000.

Whitehall, Michigan
Project Manger for a remedial investigation/feasibility study of an abandoned foundry facility in western Michigan. Groundwater in an unconfined outwash aquifer was contaminated primarily with casting wastes and casting sand binding agents. Was responsible for the supervision and technical review of site work. Responsible for the design of interim groundwater remediation measures, including collection of affected groundwater through recovery wells, and ex-situ treatment via air stripping and activated carbon. Budget allocation was $750,000.

Level-of-Effort Contract – Lead Engineer / Hydrogeologist
Served as Principal Hydrogeologist for the technical proposal associated with a State of Michigan "Level of Effort" contract (circa 1989). Technical review scenerio involved identifying the extent and isolating the sources of multiple organic and inorganic groundwater contamination plumes impacting a municipal water supply consisting of a three-layer aquifer system. Was responsible for presenting and defending proposed technical and cost recovery strategies. Brown & Root Environmental (then Halliburton NUS Environmental Corporation) was ranked first of six national consulting firms selected for contracts. Performed and coordinated the development of design specifications and operation and maintenance plans for the implementation of remedial technologies including, but not limited to, soil vapor extraction, in-situ air sparging, air stripping, granular activated carbon, filtration, ion-exchange, advanced precipitation, enhanced bioremediation, and advanced oxidation processes.

Research and Development, Remote Methodolgies for Plume Delineation
Conducted research to develop and optimize a soil gas sampling and analytical method for detecting certain halogenated aliphatic compounds in unconfined granular aquifers. Study involved the design of a comprehensive data acquisition program, including soil gas, water quality, and soil sampling to identify statistically significant correlations between sources contributing vapors to the vadose zone and the results from the analyses of soil gas samples. The technique was used to successfully define sources (residual product), and track the general migration of plumes of the target constituents. Data were also used to locate DNAPL accumulations.

Method Development, Soil / Groundwater Sampling and Analysis
In 1990, coordinated the development of drilling and field analytical procedures for the acquisition of depth-specific groundwater quality and soil samples using a hollow-stem auger drill rig and gas chromatography instrumentation owned and operated by the Brown & Root Environmental, Michigan District Office.

PUBLICATIONS/PRESENTATIONS

Mayotte, T. J., Redox Gradients, TCE Reductive Dechlorination, and Cr(VI) Detoxification in Bioaugmented Model Aquifer Systems, Ph.D. Thesis, Michigan State University.

Mayotte, T. J., 1988; An investigation of a soil gas sampling technique and its applicability for detecting gaseous PCE and TCA over an unconfined granular aquifer: Abs., Ground Water, v. 26, no. 6, p. 806.

Mayotte, T. J., 1993, A perspective on the benefits of the Subsurface Volatilization and Ventilation System for promoting rapid and cost-effective remediation of volatile organic contamination in the subsurface; presented at the National Ground Water Association 45th Annual Convention and Exposition, Chlorinated Volatile Organic Compounds in Ground Water, Kansas City.

Mayotte, T. J., 1993, Subsurface volatilization and ventilation for VOC contamination, The National Environmental Journal, Vol. 3, No. 6, pp. 36-43.

Mayotte, T. J., The SVVS - SITE demonstration, Seminar on Cost Effective In Situ Restoration of Soil and Groundwater, SVVS, Brown & Root Environmental, November 1993, Southfield, MI.

Mayotte, T. J., An application of a practical column method for assessing bioaugmentation potentials in VOC-contaminated aquifers, Michigan Ground-water Professionals Winter Forum, January 1994, Western Michigan University, Kalamazoo.

Mayotte, T. J., 1994, An evaluation of aquifer bioaugmentation with *Pseudomonas sp.* strain KC to remediate carbon tetrachloride, Geological Society of America, 27th Annual North-Central Section Meeting, Abs. with Prog., Western Michigan University, Kalamazoo.

Mayotte, T. J., 1994, Bioenhancement for rapid and cost-effective remediation of multi-phase subsurface contamination; presented at the Geological Society of America, 27th Annual North-Central Section Meeting, Western Michigan University, Kalamazoo.

Mayotte, T. J., 1994, The Schoolcraft Site - the discovery and remediation of multiple groundwater contamination problems in a rural village; Field Trips Guidebook, Geological Society of America, 27th Annual North-Central Section Meeting, pp. 19-28, Western Michigan University, Kalamazoo.

Mayotte, T. J. and S. B. Thompson, 1994, Controlled vapor circulation in subsurface materials to enhance the bioremediation of organic contaminants, Proceedings, USEPA Fifth Forum on Innovative Hazardous Waste Treatment Technologies, Domestic & International, Chicago.

Dybas, M. J., T. J. Mayotte, and C. S. Criddle, 1994, Use of alkaline niche adjustments to enable colonization and remediation of carbon tetrachloride-contaminated aquifer materials, Proceedings, American Society of Microbiology Annual Meeting, Las Vegas.

Mayotte, T. J., 1994, A bioenhancement process for rapid remediation of multi-phase subsurface contamination, American Association of Petroleum Geologists Bulletin, v. 78, no. 8, pp. 1331-32. *Winner of Best Poster Paper award - Environmental Geosciences.*

Dybas, M. J., T. J. Mayotte, and C. S. Criddle, 1994, Alkaline niche adjustment for remediation of non-sterile environments contaminated with carbon tetrachloride, American Association of Petroleum Geologists Bulletin, v. 78, no. 8, pp. 1328-29.

Dybas, M. J., G. Tatara, W. Knoll, T. J. Mayotte, C. S. Criddle, 1995, Niche adjustment for bioaugmentation with *Pseudomonas sp.* strain KC, Bioaugmentation for Site Remediation, R. E. Hinchee, A. Leeson, and L. Semprini (Eds.), Battelle Press, Columbus, OH, pp. 77-84.

Introduction to Air Sparging and Soil Vapor Extraction System Design, short course module of Western Michigan University's Summer Hydrogeology Field Camps, 1995 - 97.

Mayotte, T. J., 1995, The bioenhancement procedure, ECON Magazine, October 1995.

Mayotte, T. J., M. J. Dybas, C. S. Criddle, 1996, Bench-scale evaluation of bioaugmentation to remediate carbon tetrachloride-contaminated aquifer materials, Ground Water, v. 34, no. 2, pp. 358-368.

Mayotte, T. J., 1996, Bioaugmentation of aquifer materials for treatment of chlorinated solvents, presented at the 18th Annual Solid and Hazardous Waste Management Conference, Louisiana Department of Environmental Quality, Lafayette, LA.

Mayotte, T. J., M. J. Dybas, and C. S. Criddle, 1996, Aquifer bioaugmentation with *Pseudomonas sp.* strain KC to remediate carbon tetrachloride - a bench study, Proceedings, Air & Waste Management Association's 89th Annual Meeting & Exhibition, Nashville, TN, June 1996.

Dybas, M. J., S. Bezborodinikov, T. Voice, D. C. Wiggert, S. Davies, J. Tiedje, C. S. Criddle, O. Kawka, M. Barcelona, and T. J. Mayotte, 1997, Evaluation of bioaugmentation to remediate an aquifer contaminated with carbon tetrachloride, Fifth International Symposium on In Situ and On-Site Bioremediation, Batelle, Columbus, OH.

Mayotte, T. J., Brownfield Site Rehabilitation, Midland Mortgage Corporation's Seminar on Architectural Standards, Clearwater, Florida, January 1997.

Dybas, M. J., M. Barcelona, S. Bezborodnikov, S. Davies, L. Forney, O. Kawka, T. Mayotte, L. Sepúlveda-Torres, K. Smalla, M. Sneathen, J. Tiedje, T. Voice, D. Wiggert, M. Witt, C. Criddle, 1997, Pilot-scale evaluation of bioaugmentation for in-situ remediation of a carbon tetrachloride-contaminated aquifer, Environmental Science & Technology, v. 32, no 22, pp. 3598-3611.

Mayotte, T. J., Aquifer bioaugmentation with *Pseudomonas sp*. strain KC to remediate carbon tetrachloride - a bench study, Golder Associate's Natural Attenuation Seminar, Princeton, New Jersey, April, 1998.

Hyndman, D. W., M. J. Dybas, A. Chan, L. Forney, R. Heine, T. Mayotte, M. S. Phanikumar, G. Tatara, J. Tiedje, T. Voice, R. Wallace, D. Wiggert, X. Zhao, and C. S. Criddle, 2000, Hydraulic characterization and design of a full-scale biocurtain, Ground Water, v. 38, no. 3. pp. 462-474.

Mayotte, T. J., 2000, Subsurface contamination at dry cleaning facilities: site characterization and remediation, Illinois Dry-Cleaning Association Bi-Annual Conference, Chicago, IL.

Kim, H., L. Dybas, T. J. Mayotte, S. Hashsham, and M. J. Dybas, 2001, Effects of several electron donors on dehalogenation in anaerobic soil microcosms, The Second International Conference on Remediation of Chlorinated and Recalcitrant Compounds, San Diego, California.

Dybas, M. J., D. W. Hyndman, M. S. Phanikumar, R. Heine, T. J. Mayotte, G. Tatara, T. Voice, D. Wiggert, J. Tiedje, R. Wallace, X. Zhao, and C. S. Criddle, 2002, The Schoolcraft Bioaugmentation Project: Efficient Long-Term Remediation in a Heterogeneous Aquifer, National Ground Water Association Annual Meeting, Las Vegas, NV.

Mayotte, T. J. and M. J. Dybas, 2003, Redox Gradients and TCE Dehalogenation in a Bioaugmentation Treatment Zone, Seventh International Symposium on In Situ and On-Site Bioremediation, Orlando, Florida.

Mayotte, T. J. and M. J. Dybas, 2004, Redox Gradients, TCE Reductive Dechlorination, and Cr(VI) Detoxification in Bioaugmented Model Aquifer Systems, Third International Conference on Oxidation and Reduction Technologies, San Diego.

Mayotte, T. J., D. M. Capone, 2004, In Situ Redox Manipulation and Fixation of Cr(VI) in Vadose Zone Soils, Third International Conference on Oxidation and Reduction Technologies, San Diego.

Mayotte, T. J. and M. J. Dybas, Evaluation of Dechlorination Kinetics and Halorespiration Activity in Bioaugmented Column Microcosms, Ground Water, manuscript in preparation.

Mayotte, T. J. and M. J. Dybas, Biotransformation of TCE and Numerical Modeling of Dechlorination in an Inoculated Flow-Through Column System, manuscript in preparation.