

John C. Drobinski, P.G., LSP



Mr. Drobinski has over 25 years of experience in geology and hydrogeology at varied industrial and MCP waste sites. He has worked on more than 100 hazardous waste site investigations, evaluating the impact of contaminants on soil and groundwater.

Mr. Drobinski oversees all major geology and hydrogeology projects for ERM's Boston office. His specialties include bedrock geology, geologic and hydrogeologic site characterizations, DNAPL studies, cost-effective evaluations of site contamination, fate and transport modeling, New England geology, and agency negotiations. Mr. Drobinski has managed site investigations, environmental and health risk evaluations, and remedial designs for MGP sites in New England.

Mr. Drobinski's experience with facility siting studies includes site explorations, seismic risk assessments, hydrogeologic characterizations, seismo-tectonics, and faulting studies. He is responsible for the planning, coordination, staffing, and development of geology studies for regional site characterizations for critical and nuclear facilities.

Mr. Drobinski is responsible for the planning, coordination, staffing, and development of geology studies for site characterization, remedial design, and construction management. Field studies regularly involve the integration of hydrogeologic, geologic, geotechnical and geophysical data.

Mr. Drobinski has extensive experience working with controversial issues in emotionally charged public arenas and he is a Selectman, and past Chairman, of the Planning Board in the Town of Sudbury, Massachusetts.

Registrations & Professional Affiliations

- Registered Professional Geologist in Oregon
- Licensed Site Professional
- Licensed Site Professional Association
- Selectman: Town of Sudbury
- Chairman: Sudbury, Assabet, and Concord Wild & Scenic Rivers Council
- Massachusetts Municipal Association: Environmental and Land Use & Housing Subcommittees

Fields of Competence

- Site Investigation & Remediation
- Remedial Design & Construction
- Industrial & Manufactured Gas Plant Projects
- Geophysical Investigations
- Regulatory Negotiations

Education

- M.Sc. Geology, University of Queensland, Australia, 1979
- M.Sc. Q. Geology, University of Queensland, Australia, 1976
- B.A. Chemistry, Nason College, Maine, 1969

Publications

Drobinski, J. (1988). "Geological Setting of the Moodus, CT Area," AGU Abstracts, EOS, April 1988.

Drobinski, J. (1984). "Geologic and Geophysical Criteria for Siting a HVDC Ground Electrode," AEG Abstract, April 1984.

Drobinski, J. (1976). "The Use of Solid State Nuclear Track Detectors as a Passive Radon Detection System in Uranium Exploration," M.Sc. Thesis, University of Queensland, Brisbane, Australia.

Key Projects

Principal-in-Charge for site characterization, remedial design, and response actions at the Shpack (MA), Iron Horse Park (MA), Burgess Brothers (VT), and Keegan (ME) Superfund sites. Activities included directing and designing fast track response actions, agency approvals, projects, and construction management.

Lead Investigator for the characterization and remediation of chlorinated solvents at Raytheon testing and manufacturing facilities in Massachusetts, Rhode Island, and Connecticut. Projects included DNAPL source identification, assessment of the extent of soil and groundwater impacts, soil removal actions, fractured rock studies, installation of groundwater remediation systems, and coordination with state and local agencies.

Principal-in-Charge for the site characterization and implementation of bioremediation of DNAPL in fractured rock at a South Boston manufacturing plant. Borehole geophysical, aquifer, and microcosm studies were conducted in support of the design and implementation of microbial reductive dehalogenation.

Oversaw remedy selection and implementation for a site in South Boston, MA with chlorinated solvents in fractured bedrock. The project included borehole geophysical logging, aquifer testing, preparation of two feasibility studies, implementation of a treatability study to evaluate the effectiveness of bioremediation, and implementation of a pilot study of anaerobic bioremediation, including bioaugmentation with non-native microbes.

Oversaw the preparation of a feasibility study for a Superfund site in Bennington, VT involving the evaluation of remedial alternatives for a landfill, lagoons, and a plume of groundwater impacted by chlorinated solvents. Selected remedy included soil

vapor extraction and capping for source control, and natural attenuation for management of migration.

Lead Investigator for a chlorinated groundwater contamination study of Wells G & H in Woburn, MA. Provided expert witness testimony in the Woburn Toxics Trial for the Wells G & H Superfund Site. Testified in Federal District Court for 10 days.

Lead investigator for a waste oil site in Hows Corner, ME. Determined the fate and transport, remedial action, and risk assessment of DNAPL for a fractured rock system. Additional studies included alternative water supply systems and development of remedial response.

Program Manager for remedial assessments and response actions at abandoned MGP sites in Everett, Worcester, Cambridge, and New Bedford, Massachusetts.

Program Manager for DNAPL assessment studies and remedial designs in fractured bedrock systems at industrial sites in New Hampshire, Maine, and Massachusetts.

Program Manager for the assessment of a landfill closure for a mixed radiological and hazardous waste site under CERCLA.

Technical Consultant for preparation of EPRI's manual for the Electric Utility Industry on seismic risk in the eastern United States.

Member of AIM Association Advisory Committee responsible for commenting and providing input to DEP related to implementation of the Massachusetts Contingency Plan (MCP).

Member of a Project Team developing site investigation protocols at Manufactured Gas Plants (MGPs) for an American Gas Institute 4-volume report.

Project Manager for numerous siting and hazardous waste site assessments, including remedial investigations at a municipal well field, remedial investigations, MCP remedial responses at rail facilities,

David W. Blaha, AICP



Mr. Blaha has 24 years of experience in environmental and social impact assessment, natural and cultural resource management, and sustainable development. He is thoroughly familiar with both U.S. and international EIA regulatory/procedural requirement and has extensive experience addressing endangered species, indigenous peoples, wetlands, and environmental justice issues. Special expertise in evaluating energy, land use, extractive industry, military, water resource, and transportation projects.

Registrations & Professional Affiliations

- American Institute of Certified Planners, 1986

Fields of Competence

- Sustainability planning including stakeholder engagement and development of sustainability indicators, metrics, and monitoring programs.
- Environmental impact assessment for a wide variety of projects including reservoirs, marinas, hydroelectric power projects, LNG import terminals, gas pipelines, highways, transit, housing, parks, military facilities and industrial development.
- Public participation including the development of innovative, collaborative stakeholder engagement programs and consensus-based public participation processes.
- Regional environmental planning including river basin studies, forest management plans, wildlife corridors, and natural resource management plans for parks and preserves.

Education

- Master of Environmental Management, Duke University, 1981
- B.A., Biology, Gettysburg College, 1978

Languages

- Some familiarity with Spanish

Key Projects

East Iceland Sustainability Initiative – Project Director for project assessing the sustainability of a controversial hydropower and aluminum smelter project in a rural area of Iceland. Assisted Alcoa in the development of an overall corporate sustainability framework, as well as specific environmental, social, and economic indicators and metrics.

Southern Maryland Regional Environmental Strategy – Project Manager for developing a regional environmental strategy for the fastest growing area of Maryland, building on a sustainable development theme. Included development of an environmental scan. Major recommendations addressed Transit-Oriented Development, rural land preservation, and a green infrastructure plan for protecting an interconnected system of undeveloped lands for wildlife habitat.

Aberdeen Proving Ground Sustainable Development Assessment Tool, MD – Project Director for development of innovative GIS-based tool for evaluating cumulative effects of multiple projects on ecological carrying capacity of 72,000 acre installation on the Chesapeake Bay for U.S. Army Corps of Engineers. Tool being used in developing an overall sustainable development plan for the installation.

Potomac Region Master Plan, Montgomery County, MD – Project Manager for developing a predictive model of the effects of land development (e.g., impervious coverage, riparian buffers, forest cover, septic systems, stream geomorphology, and other variables) on aquatic health as measured using the Aquatic Index of Biotic Integrity (IBI). The results of this analysis will be used in developing a sustainable development master plan for three watersheds draining to the Potomac River and as a template for the rest of the County.

Chester County Sustainable Development Plan, PA – Project Manager for developing in conjunction with a citizen advisory committee a sustainable development assessment methodology and indicators for use in evaluating proposed land development projects.

Watershed Management, El Salvador – Invited by the U.S. State Department as the principal speaker for an Earth Day conference on integrated watershed management and sustainable development in El Salvador. Participants in the conference included federal ministry representatives, NGO leaders, university professors, and the media.

Xacbal Hydroelectric Project, Guatemala – Project Director for environmental and social due diligence review of a 94 MW hydropower and 125 km transmission line project on the Xacbal River in northern Guatemala for the Inter-American Investment Corporation (IIC). Key issues focused on ecological base flows, compensation for land acquisition, a community investment program, and overall project sustainability.

Defenders of Wildlife Biodiversity Project, Western United States – Project Director for coordinating and facilitating a national workshop on biodiversity including the pre-eminent researchers in the United States and Canada. Based on the workshop, developed the Defenders of Wildlife Biodiversity web site.

Crown Landing LNG Project, United States – Project Manager for a 1.2 BCF/DLNG import terminal for BP consisting of a marine terminal and an on-shore regasification facility. Responsible for preparing the Environmental Report for FERC, and federal and state permitting. Responsible for ensuring project was consistent with BP's sustainability and biodiversity corporate principles.

landfill assessments, feasibility studies, and the siting of nuclear facilities in Vermont, Connecticut, Maine, Massachusetts, New Brunswick, Ohio, and Brazil.

Project Manager for geologic investigations in northern New England to characterize seismic risk and find evidence of capable faulting. Multi-disciplinary investigation included geologic testing and analysis and geophysical surveys.

Project Manager for geologic consulting services to Maine Yankee for review of the Bottle Lake and Sebago Pluton high-level radioactive waste site.

Project Manager responsible for all aspects of HVDC ground electrode, including geologic and geophysical investigations in Vermont, New Hampshire, and Quebec.

Project Geologist responsible for geologic characterizations at two proposed nuclear plants in New York. Widely varying site conditions were evaluated with innovative geophysical and geologic assessment techniques. Seismic risk evaluations were also conducted and a presentation was given to the Nuclear Regulatory Commission on geological and seismic issues related to siting nuclear facilities.

Project Geologist responsible for geotechnical evaluation of geologic conditions at Bear Swamp, Harriman Dam, and Vermont Yankee.

Principal-in- Charge of the environmental assessment, remedial response actions and asbestos abatement at a former refinery, production area and tank farm at La Brea Trinidad and Tobago for a proposed LNG processing facility, storage and marine terminal.

Principal-in-Charge for an EIA, site assessment, site remediation, and remedial construction management at the former Petrotrin refinery, tank farm and marine terminal at Point Fortin Trinidad and Tobago for a large LNG facility. The site is the locus of ALNG's trains 1 to 3 LNG processing, storage, and marine terminal.

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Principal-in-Charge for remedial response actions, construction management, hazardous waste management and regulatory issues at the Everett, Ma LNG terminal and storage facility. Activities are related to ongoing site activities as well as during construction of a \$ 180 million High Pressure Project and other site upgrades.

Principal-in-Charge for environmental, geotechnical and seismic components of the Wells Maine LNG Tank siting Project. Project included FERC submittals and support for FERC hearings and construct ability issues.

Program Manager for geological, geotechnical and seismic risk assessment studies and remedial designs for the FERC filing for the proposed Weavers Cove Energy LNG marine terminal in Fall River Ma. Responsible for the geotechnical, geological, seismic input for the FERC Resource Reports as well as the environmental assessment and regulatory closure of former on-site petroleum tank farm.

Benjamin R. Frothingham, C.G., P.G., LSP



Mr. Frothingham is a Registered Professional Geologist, Certified Geologist, and Licensed Site Professional with more than 20 years of international environmental consulting experience, including LNG Marine Terminal development and management of oil and hazardous waste from refineries, industrial manufacturing facilities, power plants, maintenance/automotive facilities, and numerous other industries. He has also conducted oil and hazardous waste investigations at military and other public facilities.

Mr. Frothingham's experience includes project management and team leadership for a wide range of projects in the U.S., Caribbean, and Canada. Mr. Frothingham's strengths include client satisfaction, regulatory analyses, budget and schedule tracking, coordination and supervision of field crews, office and field data acquisition, data interpretation and report preparation, and public and private presentation of results and conclusions.

Mr. Frothingham has worked on environmental projects in Trinidad since 1993. He lived in Port of Spain and managed ERM's office in Trinidad in 1997 and 1998. Mr. Frothingham managed EIA compilation as well as the assessment and cleanup of oily wastes at the proposed ALNG facilities in La Brea and Point Fortin. He has also managed other projects in Trinidad including compliance audits, oil and hazardous waste audits, air quality studies, ISO-14001 benchmarking, asbestos sampling and remediation, and wastewater system maintenance.

Registrations & Professional Affiliations

- Licensed Site Professional in Massachusetts
- Certified Geologist in Maine
- Professional Geologist in Tennessee & Arkansas
- National Groundwater Association
- USCG Master License

Fields of Competence

- Management of Oil and Hazardous Waste Sites
- Assessment and Remediation of Petroleum Release Sites
- Geologic Investigations in Support of FERC and Other Facility Permitting Efforts
- Assessment & Treatment of Oily and Hazardous Waste
- Remedial Investigations
- Environmental Compliance Evaluation of Industrial Facilities
- Feasibility Evaluation Support
- Underground Storage Tank (UST) Management
- Remedial System Design and Implementation Support
- Site Remediation Monitoring and Evaluation
- Contaminant Hydrogeology
- Environmental Sampling Network Design and Implementation
- Water Supply Development and Implementation
- Geophysical Investigations

Education

- Masters Course Work, Ground Water Hydrology, Boston University, 1989
- B.A. Geology, Guilford College, North Carolina, 1982

Key Projects

Project Manager for compilation of an EIA as well as the assessment and cleanup of contaminated soil at the proposed ALNG facilities in La Brea and Point Fortin. This project also included asbestos assessment and remediation, the development of soil remediation standards for the site based on a review of Trinidad's environmental regulations and other international standards, and review of contractor environmental compliance to project standards.

Project Manager of the site investigation and remediation of an inactive oil and gas production/refining facility in Trinidad, West Indies. Evaluated site conditions, excavated oil pits, and developed remedial plan.

Project manager for audit of oil and hazardous waste disposal contractors for a major ammonia company in Trinidad. The results of the audit were used to determine future disposal practices for the plant in order to limit disposal related liability.

Project manager for remediation of oily waste pits in Southern Trinidad. Remediation included removal of liquids and sludges and bioremediation of oil-contaminated soil.

Project Manager for environmental audit of ammonia plant in Point Lisas Industrial Estate for potential property transfer. Audit included evaluation of plant performance, use of best management practices, potential liabilities, compliance with PLIPDECO, EMA, and international standards, and potential impacts to Mangrove swamp.

Project Manager for environmental audit of hot briquetted iron plant in Point Lisas Industrial Estate. Audit included evaluation of past plant performance, applicable best management practices, potential liabilities, issues surrounding restart of plant, compliance with PLIPDECO, EMA, and international environmental standards, and potential impacts to Mangrove swamp.

Project Manager for upgrades and maintenance of package wastewater treatment plants for nitrogen and ammonia manufacturing facilities in Point Lisas Industrial Estate.

Project Manager for ISO-14001 benchmarking for food and beverage manufacturer in Trinidad.

Project Manager for air quality assessment of steel casting facility operated by a multinational corporation in northern Trinidad.

Project Manager for site assessment of parcel in Point Lisas Industrial Estate for potential development by heavy industry.

Provided consulting services to the National Petroleum Company and Powergen on a number of environmental issues, including underground storage tanks, site assessment and remediation, and environmental management systems.

Served on American Chamber of Commerce Environmental Committee to address environmental issues in Trinidad & Tobago as well as comment on draft environmental regulations.

Project manager for assessment and computer modeling of the Erin Sands Aquifer in central Trinidad. The assessment included evaluating reserves, identifying potential sources of groundwater contamination, and evaluating effects of oil and gas production in the region.

Jeffrey J. Plante, P.E., C.I.P.S.



Mr. Plante has 26 years of corporate and consulting experience in developing, coordinating, budgeting, implementing, and managing comprehensive corporate environmental and engineering programs, policies, and design/build projects. This includes 16 years of direct electric utility generation, transmission, and distribution experience and 12 years of supervisory experience.

Areas of expertise include environmental compliance; permitting and licensing; civil engineering and design; contingency and security planning; federal, state, regional and local agency interaction; resource management and planning; site investigation, remediation, and reuse; auditing; pollution prevention; risk minimization; training; waste management; and corporate acquisition/mergers, asset divestiture, and reorganization.

Registrations & Professional Affiliations

- Professional Engineer's Licenses (Civil): MA, RI, and ME
- Certified Infrastructure Preparedness Specialist (CIPS)
- MA Licensed Drinking Water Supply Facility Operator Grade 1T
- MA Licensed Drinking Water Supply Facility Operator Grade VSS
- MA Certified Title V Inspector
- Northeast Energy and Commerce Association
- New England Environmental Business Council – Energy Committee
- American Society of Civil Engineers
- Environmental Auditing, Arthur D. Little
- OSHA 1910.120 (2005 Refresher)
- Hazardous Materials Technician for Incident Response (24 hour)
- Hazardous Waste Site Operations (40 hour)
- Waste Site Supervisors Training (8 hour)

Fields of Competence

- Environmental permitting and licensing (federal, regional, state, and local)
- Disaster planning, security planning, and emergency-response program development, implementation, and administration, including OPA-90, MTSA, SPCC, and hazardous waste contingency planning
- Feasibility studies and impact assessments
- Utility infrastructure expansions, improvements, and new facility construction
- Federal, regional, state, and local agency interaction, negotiation, and testimony
- Utility industry representation and public participation programs

- Utility reengineering, deregulation, divestiture, and mergers/acquisitions
- Environmental Auditing, and Environmental Management System Assessment and Development
- Wetlands, air, water, waste water, stormwater, and solid waste program management
- Hazardous waste management and special waste program management
- Site assessments, remediation, and reuse of major and minor waste sites involving manufactured gas plants, underground storage tanks, PCBs, landfills and oil/fuel spill sites under the MCP, RI Remediation Regulations, CERCLA and RCRA
- Pollution prevention, environmental risk management, and MA Toxic Use Reduction Act
- Stakeholder outreach

Education

- Graduate Certificate Program in Geographic Information Systems, Northeastern University, Massachusetts, on-going
- CIPS Certification Training, 2006
- M.S. Environmental Engineering, Northeastern University, Massachusetts, 1989
- B.S. Civil Engineering, University of New Hampshire, New Hampshire, 1980

Key Projects

Environmental Permitting Experience

Mr. Plante has extensive experience in dealing with all aspects of environmental permitting, compliance, and impact analyses for electric utility related projects, telecommunications projects, natural gas pipeline projects, fuel oil terminals, LNG facilities, hydroelectric facilities, and waste site projects located along coastal and inland resource areas. This experience encompasses work on dozens of projects associated with construction of existing and new facilities. Experience includes large complex (fixed) facility locations, mobile facilities, and linear facilities. Linear project experience encompasses overhead, underground, and submarine utility installations (coastal and inland). Work on issues relevant to Rights-of-Way including vessel, vehicle, and aircraft impact assessments; EMF; watershed/waterway protection; vegetation management; structure maintenance;

reliability; public access; and ROW dumping. Tasks that have been performed include, but are not limited to, feasibility and impact studies, field delineation, construction/access route location, filing preparation and agency negotiation, property acquisition and easement acquisition assistance, stakeholder outreach, and project monitoring. In completing these tasks, Mr. Plante has worked with numerous regulatory agencies, including:

- US Army Corps of Engineers, USEPA, US Coast Guard, US Dept. of Defense, NOAA, USDOT, FERC, US Fish & Wildlife
- Massachusetts DEP, CZM, and EOE (MEPA requirements), Marine Fisheries, Fish & Wildlife
- Rhode Island DEM and CRMC
- Various state EHS agencies
- State Public Utility Commissions;
- Local Conservation Commissions and Harbormasters.

Emergency Response and Contingency Planning Experience

Mr. Plante has extensive experience in researching, developing, certifying, implementing, auditing, and conducting personnel training for a wide range of emergency response, security, and contingency plan programs associated with electric utility facilities, gas pipeline facilities, LNG facilities, transportation facilities, and various other commercial and industrial facilities. Management of this work involves multiple regulatory programs including SPCC, OPA-90, MTSA, DOT, OSHA, UST and federal/state hazardous materials/wastes. Facility types included power generation plants, regional operating service centers, satellite operating centers, substations, transmission/distribution Rights-of-Ways (ROWs), fuel oil and LNG storage terminal facilities, hydroelectric facilities, railways, manufacturing facilities, and numerous commercial based facilities.

Stormwater Experience

Mr. Plante has worked on numerous coastal and inland stormwater permitting and compliance projects associated with existing facilities and new construction. Facility types included power generation plants, regional operating service centers, satellite operating

centers, substations, and transmission/distribution Rights-of-Ways (ROWs), fuel oil and LNG terminal facilities, hydroelectric facilities, and railways. Permitting and compliance efforts included nationwide permits, state water quality certifications, stormwater management/pollution prevention plans, and state subsurface injection permits, administered by USEPA, USACOE, CZM, MADEP, RICRMC, RIDEM, and other state agencies.

Wastewater Experience

Mr. Plante's utility, commercial, industrial, and municipal wastewater experience includes both industrial waste and sanitary sewage facility permitting and compliance issues associated with power generation facilities, regional / satellite operating service centers, commercial/industrial facilities, and municipal wastewater treatment facilities.

While working with fossil fuel generation facilities, he was involved with numerous permit renewals, permit modifications, and facility upgrades under the co-managed federal and state NPDES permit program. Mr. Plante also worked on numerous affiliated generation facility projects involving discharge monitoring, solids management, O&M manuals, and operator certification. The regional and satellite operating service center projects that Mr. Plante worked on included permitting and compliance for garage and vehicle wash facilities, oil/water separator equipment, municipal pretreatment program standards, groundwater remediation systems, and on-site septic systems. Utility related wastewater treatment plant facilities were located predominantly in Massachusetts and Rhode Island, with addition facilities throughout the Northeast.

Municipal wastewater treatment plant experience included infrastructure research and facility planning, facility design, permitting and licensing, construction oversight, training services, start up services, and system optimization. Representative facilities included Boston, Leominster, and Marlborough, Massachusetts; Warren, Rhode Island; Milford, Connecticut; Blue Plains, Washington DC; and various other locations throughout the Northeast US.

EMS Experience

Mr. Plante has been actively involved in Environmental Management System program development and auditing for almost 20-years, having received formal training from several environmental auditing organizations. Initial EMS efforts included the development and implementation of an EMS program for a major electric generation, transmission, and distribution utility, while working in the utility sector. Program elements included internal system audits of multi-media environmental programs as well as external audits of upstream and downstream vendor operations and facilities. Internal facilities were located throughout New England, focused primarily in Massachusetts and Rhode Island. External facilities and vendors were located throughout the US.

As a consultant, Mr. Plante continues to provide EMS program development and implementation services, and conducts EMS audits, for utility clients, including electric (fossil fuel and hydroelectric), natural gas, and LNG facilities. Corporate and facility specific locations are located throughout the US. Mr. Plante also provides EMS program services and facility audits for commercial and industrial clients. Services are performed at the request of facilities and parent corporations, as well as through due diligence proceedings associated with Mergers and Acquisitions. Representative industry sectors include rail road, metals fabrication, plastics, electronics, chemical, equipment rental, minerals and mining, and petrochemical facilities located throughout the Northeast US.

MGP Experience

Mr. Plante has worked on a number of former manufactured gas plant and power generation sites in Massachusetts and Rhode Island. These sites consisted of jointly owned facilities, solely owned facilities, inactive facilities, and facilities with on-going electric and/or gas operations. Duties included regulatory oversight, community involvement, insurance and legal interaction, and Potentially Responsible Party (PRP) coordination associated with site investigation, remediation, and redevelopment analysis activities.



Ms. Rawa has over 13 years of experience providing leadership for environmental and social impact assessments; overseeing permitting of upstream and mid-stream energy projects; conducting strategic stakeholder engagements; working with multilateral institutions; and developing tactical corporate social responsibility and sustainable development strategies for clients operating in socio-economically and environmentally complex regions.

Ms. Rawa has a comprehensive understanding of international environmental standards and best management practices associated with planning and implementation of energy development projects including the guidelines established by multilateral finance institutions and industry organizations such as the World Bank Group, the Inter-American Development Bank, the European Investment Bank, International Petroleum Industry Environmental Conservation Association (IPIECA), International Association of Oil and Gas Producers (OGP), American Petroleum Institute (API), and the Asociación Regional de Empresas de Petróleo Gas Natural en Latinoamérica y el Caribe (ARPEL). Ms. Rawa also has experience working with a broad range of NGOs.

Ms. Rawa has chaired numerous sustainable development seminars and presented in public forums/conferences. She has worked in the United States, Central and South America, and North Africa, and is fluent in English, Polish, Spanish, and French.

Fields of Competence

- Sustainable development and CSR strategy
- Environmental and social impact assessments and baseline studies
- Experience with NGOs, multilateral banks, foundations and other institutions
- Stakeholder consultation, consensus building, negotiation, and partnering
- Conceptualization and development of innovative communication/reporting materials
- Work and living experience in North America, North Africa, Europe and South America

Education

- M.S., Biology, Stanford University, Cum Laude, 1993
- B.S., Biology, Stanford University, Cum Laude, 1992

Languages

- Fluent in Polish
- Fluent in Spanish
- Fluent in French

Honors and Awards

- Institute of the Americas Panelist, Conference on Sustainable Development in Latin America. 2005.
- Seminar Chair. Sustainability Strategy and Implementation: A Balancing Act. 2005.
- Donella Meadows Sustainability Leadership Fellow, Sustainability Institute. 2003-2004.
- Seminar Chair. Sustainability Strategy and Implementation: Achieving Common Goals. 2004.
- Seminar Co-Chair. Sustainability Strategy and Implementation: Managing Risks. 2003.

- EPA Peer Review Panels, Grants for Research Program; Education Fellowship Program, 1997 - 1998.

Publications

Rodriguez, F. D., A. Carter and A. Rawa. 2005. Cross Sector Partnerships Result in Increased Marine Biodiversity Information, Awareness and an Initial Biodiversity Action Plan in the Gulf of Paria, Venezuela. Oceans Conference. Washington, D.C.

Rodriguez, F. D., F. Rivera, and A. Rawa. 2004. Benefits of Locality Management in Context of Hydrocarbon Development: A Journey Towards Sustainable Development in the Gulf of Paria. SPE Conference. Calgary, Canada.

Rawa, A. 2002. Environmental Management for Large Pipeline Projects – The New Paradigm. Presentation. Latin American Power and Gas Conference. PowerGen, Monterey, Mexico.

Harte, H., A.D. Rawa, and V. Price, 1996, The Effects of Manipulated Soil Microclimate on Mesofaunal Biomass and Diversity, *Soil Biology and Biochemistry*, 28(3):313-322.

Rawa, A., C. C. Peterson, and C. Eich. 1995. Importance of Using National Data in Comparative Bioaccumulation Studies: A Case Study. Paper presented at the Society of Environmental Toxicology and Chemistry (SETAC) World Congress, Vancouver, Canada.

Key Projects

Hydrocarbon Development

HSE and Sustainable Development Assessments for Assets in Latin America, 2006 - Ongoing – Managing a process to establish baseline health, safety, environment and sustainable development data for ConocoPhillips Latin America Assets in Colombia, Peru, Ecuador and Argentina. This work requires a systematic evaluation of past and present conditions on a total of 11 concessions operated by ConocoPhillips or its partners, including evaluating local, national and international

stakeholders that may be of relevance to the company's business decisions and operations in these countries.

Corocoro Oil Development Project, Gulf of Paria, Venezuela, 2002 – Ongoing – Since 2002, has been supporting ConocoPhillips Latin America in the process of implementing its sustainable development strategy in the Gulf of Paria, Venezuela, and communicating achievements to international stakeholders. ConocoPhillips Latin America has consistently been recognized for its contributions to sustainability best practice through international awards such as: Community Initiative Award, Energy Institute, UK (2005); Corporate Citizen of the Americas Award, Organization of American States, Washington, D.C. (2005), Environmental Initiative Finalist, World Oil Awards, Houston (2004). Specifically:

- Supported ConocoPhillips Latin America in refining its sustainable development strategy (2003), which provides a roadmap for the company's environmental and socioeconomic program planning and implementation.
- Managed the process of international stakeholder identification (2002-2004), and is helping to forge partnerships between the company and organizations and NGOs that can support the process of environmental and socio-economic program implementation.
- Prepared an environmental and social impact assessment summary (2005) to convey to a broad international audience how ConocoPhillips Latin America has been addressing these standards.
- She led the design (2004) and subsequent update (2005) of the public Web site (www.conocophillipsparia.com) and other sustainable development regional reporting materials needed to communicate and disseminate information concerning the ConocoPhillips achievements in the Gulf of Paria.
- On behalf of ConocoPhillips Latin America and as part of a 2006 IPIECA publication, *Partnerships in the Oil and Gas Industry*, Ms. Rawa wrote a summary of the lessons learned by the company in the Gulf of Paria.

Central Block Expansion Environmental/Sustainable Development, Trinidad and Tobago, 2003-2004 – In 2003, for British Gas (BG) Trinidad and Tobago, Ms. Rawa oversaw the development of a permitting strategy for the BG activities in Central Block, and supported the Company's efforts to incorporate applicable Conservation International's Energy and Biodiversity Initiative (EBI) guidelines on biodiversity. Ms. Rawa directed the preparation of an environmental impact assessment report submitted to the Trinidadian Environmental Management Agency (EMA) in December 2003. As part of this process, Ms. Rawa met with EMA representatives, participated in public consultation in Trinidad, and ensured client compliance with best practices. The process of integrating EBI guidelines into the permitting process with the EMA was recognized at the 2005 BG Chairman Award.

Plataforma Deltana Block 4, Northeastern Venezuela, 2004 – Ms. Rawa oversaw the environmental and social impact assessment process for Statoil Venezuela's proposed deepwater exploratory drilling in Plataforma Deltana offshore Block 4, northeastern Venezuela. She also developed a stakeholder consultation and disclosure strategy and plan for the exploration phase of Statoil activities in this region.

Mariscal Sucre LNG Project, Eastern Venezuela, 2004 – For a partnership between Shell, PDVSA and Mitsubishi, Ms. Rawa provided senior advisory services for stakeholder evaluation, engagement, and consultation for a complex project involving marine and onshore natural gas pipelines, an offshore production field, and a proposed liquefaction/export terminal to be located in Guiria on the Paria Peninsula, Venezuela. She also oversaw the preparation of this proposed project's stakeholder consultation and engagement plan.

International Development

Development of Indicators to Measure the Environmental Performance, 2006-Ongoing – On behalf of the Inter-American Development Bank (IDB), Ms. Rawa is managing the process of developing indicators that will be used to help IDB staff assess the capacity of financial intermediaries and other executing agencies to meet the new (2006) Environmental and Safeguard Compliance

Policy and other applicable environmental standards in Latin America and the Caribbean. As part of this process, Ms. Rawa is directing a process of literature review, internal (IDB) consultation, development/definition of indicators, testing of draft indicators, and conceptualization and development of a tool to implement the indicators.

Environmental and Social Due Diligence of Hydroelectric Dam, Guatemala, 2006-Ongoing – For the Inter-American Investment Corporation (IIC), Ms. Rawa is leading a team that is conducting an environmental and social due diligence of a proposed hydroelectric dam in the province of Quiche, Guatemala. The dam is being proposed in an area that is socio-economically and socio-culturally complex; more than 90 percent of the nearby communities are indigenous. Ms. Rawa is supporting the IIC in assuring that the project can meet international best practice from the standpoint of consultation and engagement.

Environmental and Social Due Diligence of Baba Hydroelectric Dam, Ecuador, 2006-Ongoing – For the Private Sector of the Inter-American Investment Bank (IDB), Ms. Rawa is supporting the process of environmental and social due diligence of a proposed hydroelectric dam near Buena Fé and Valencia, Province of Los Rios, Ecuador.

Pipelines

Kern River Expansion, California, Nevada, Utah, and Wyoming, 2001-2002 – Ms. Rawa was the biological resources task leader for the multimillion-dollar Kern River Expansion Pipeline Project for Williams Gas Pipeline. The project entailed environmental permitting of three compressor stations, the renovation and restaging of two existing compressor stations, and the construction of nearly 800 miles of pipeline looping along the existing Kern River Pipeline system in four states.

Ms. Rawa managed the preparation of FERC resource reports 2 and 3, United States Army Corps of Engineers (USACE) permit applications, and state water quality certification documents. She also supervised teams that conducted fieldwork to obtain additional required

information on biological resources. To complete the reports in accordance with FERC regulations under the Natural Gas Act, she provided close coordination with the client and state and federal regulatory agencies. Under her leadership, the FERC ER reports, agency consultation, and the required natural resource survey reports detailing results of surveys along 800 miles of the proposed pipeline route were prepared and filed with FERC within five months.

In addition, Ms. Rawa developed an environmental awareness and training pocket booklet for the Kern River project. This highly effective product provides an overview of the environmental, cultural, and paleontological resources along the pipeline route and outlines ways in which construction teams and other stakeholders can minimize impacts on area resources. The booklet was distributed to project construction teams as part of their environmental resource awareness training, and was also requested by several libraries in proximity to the pipeline route.

Buccaneer Pipeline, Alabama, Florida, and Gulf of Mexico, 2000-2001 – For Williams Gas Pipeline-Transco, Ms. Rawa managed the preparation of the joint permit applications to the Florida Department of Environmental

Protection (FDEP) and USACE for a proposed 674-mile pipeline. As part of the nearly \$2 million environmental support effort, she oversaw the integration of environmental data collected during field surveys, led the preparation of Environmental Resource Permit applications to two FDEP districts, addressed key agency concerns, and supported client representatives during agency meetings. She also contributed to the alternatives analysis report, provided a summary of the planning, permitting, and construction issues associated with pipeline siting in Florida, and compared pipeline approval processes under FERC and the Natural Gas Transmission Pipeline Siting Act within the State of Florida.

North Alabama Mainline Expansion, Alabama, 1999 – For Southern Natural Gas Company, Ms. Rawa's responsibilities included planning and coordinating biological survey activities with client representatives

and other survey crews (archaeologists and engineers), delineating wetlands and developing route modifications to minimize ecological impact, conducting QA/QC reviews of all biological survey documentation, and providing daily progress reports to the client and E&E managers.

Harper-Joliet Pipeline Expansion, Iowa and Illinois – For Natural Gas Pipeline Company of America, Ms. Rawa prepared Resource Report 2 (Water Quality) for the proposed Harper-Joliet Expansion of the Amarillo Mainline transmission system. She contacted relevant state and local agencies in Iowa and Illinois to obtain information concerning bodies of water and water quality along the entire 150-mile route.

SunShine Pipeline, Alabama, Florida, and Mississippi – For ANR Pipeline Company's 760-mile, \$1.2 billion natural gas pipeline system, Ms. Rawa participated in ecological surveys along segments of the proposed interstate pipeline route and at future equipment staging areas in three states. She helped identify and characterize vegetation and wildlife, delineate wetlands, identify state and federally protected species, and develop route modifications to minimize impacts on significant environmental features.

International Cable

ARCOS-1, Caribbean, Bahamas, Florida, Mexico, and Central and South America – The ARCOS-1 submarine fiber optic cable system comprises 24 landings in 14 countries. For New World Network Services, Ms. Rawa managed permitting oversight and support activities (totaling more than \$750,000). She oversaw environmental permitting and impact assessment activities in several countries, providing liaison between the client (ARCOS consortium members) and project investors (Barclays Bank and other secondary investors). For each country, Ms. Rawa delineated environmental permit requirements, assisted in permit acquisition, and tracked permit status. The permitting for all 14 countries was completed within one year.

MACx Cable, Puerto Rico – For Alcatel Submarine Networks, Ms. Rawa was in charge of E&E's permitting feasibility investigation and initiated preparation of

environmental assessments to comply with regulatory requirements for a fiber optic cable submarine landing in Puerto Rico that consists of one repeated segment from St. Croix and one nonrepeated segment to the Dominican Republic. She provided overall direction and quality control in the preparation of the joint permit application and associated EAs required by in-country environmental agencies.

International Development and Health

Institutional Capacity to Perform to National and International Standards, Ongoing – For the Inter-American Development Bank, Ms. Rawa is leading an effort to develop a process and indicators that can be used by the IDB staff to assess the capacity of their public and private sector client to conform to new IDB Environmental and Safeguard Compliance Policy. Specifically Ms. Rawa led the process of applicable literature review, internal and external expert stakeholder engagement and case studies, which will be used to validate tools that will be developed as part of this project.

Urban Air Evaluation, Morocco, 1996 – Ms. Rawa managed an assessment of the effects of urban air pollution on human health and the economy in Morocco, in support of the World Bank (International Bank for Reconstruction and Development) mission to develop a National Environmental Action Plan. She collected data concerning the incidence of respiratory problems and air pollution in Casablanca, Mohammedia, Safi, and Rabat. In Morocco, she visited all relevant organizations, including the Ministry of Public Health, National Department of Statistics, Ministry of the Environment, and World Health Organization, to assess data availability, interview lung specialists, and compile available reports.

Environmental Damage Claims, Kuwait, 1995 – As part of E&E's assessment of environmental damages in the State of Kuwait resulting from the 1990-1991 Iraqi aggression, Ms. Rawa prepared a report comparing pre- and post-aggression veterinary monitoring programs and services. She also prepared a report identifying potential impacts of explosive contaminants and unexploded ordnance associated with the war.

Treatment Wetlands and Hazardous Waste

Treatment Wetland, Schilling Farm, MI, 1998 – For British Petroleum (BP), Ms. Rawa completed a predictive ecological risk assessment (ERA) for a 200-acre hazardous waste site to determine the potential risks associated with an innovative plan to construct a wetland to treat TCE-contaminated groundwater. Upon review of the ERA results, the Michigan Department of Environmental Quality approved initiation of a pilot study to determine whether natural physical and biochemical processes could be used to degrade chlorinated organic compounds to concentrations at or below appropriate remedial standards.

The project involved construction of a four acre treatment wetland, as well as restoration of an existing natural wetland. Ms. Rawa delineated the existing wetland, helped prepare the work plan and contractor specifications for wetland construction and planting, and communicated with involved agencies to address technical concerns regarding the involved biodegradation mechanisms. She oversaw the six month construction of the pilot-scale treatment wetland and evaluating its performance for the first three years of operation.

SRSNE Treatment Wetland, Southington, CT – For the Solvent Recovery Service of New England (SRSNE) Site PRP Group, Ms. Rawa provided key biological support as part of a wetland pilot project at the 22 acre SRSNE Superfund site. The project was designed to determine if natural processes and subsurface treatment wetlands could cost effectively remediate volatile organic compounds in groundwater. Ms. Rawa was responsible for the environmental aspects of the conceptual design and reviewed key bench scale data obtained as part of the project by a research laboratory at Louisiana State University.

NPS Sites, Washington, D.C., and West Virginia – For the National Park Service (NPS), Ms. Rawa completed a quantitative ERA to identify the impact of contaminants on potential ecological receptors at the six acre National Capital Parks East Station, a NPS-owned portion of the Washington Gas and Light manufactured gas site in Washington, D.C. During earlier work at this site, she

managed a site inspection (SI) that included sampling, use of EPA's PreScore software package to develop a site score, and preparation of the preliminary assessment (PA) and SI reports.

New Orleans Area Parathion (NOAP), LA - At this high-visibility site, methyl parathion (an agricultural pesticide) had been misapplied in numerous residences, resulting in surface contamination at concentrations that posed a health threat to the occupants. For EPA Region 6, Ms. Rawa provided community relations support during site remediation by responding to resident questions and concerns, communicated directly with on-site EPA managers, and managed the command post's central file system, which contained all information pertaining to the contamination and remediation status of over 180 affected homes.

Global Warming

Global Warming Simulation Project, Gothic, CO, 1993 - Ms. Rawa participated in a Global Warming Simulation Project at the Rocky Mountain Biological Laboratory in Gothic, CO. She studied the effects of global warming on soil mesofauna and measured gas fluxes from soil, plant biomass production, and plant moisture stress levels.

Mark A. Worthington, C.G., LSP, LEP



Mr. Worthington is a Senior Hydrogeologist with over 20 years of diverse hydrogeologic consulting experience. Areas of expertise include hydrogeologic investigations, contaminant transport studies, and remedial design. As a Massachusetts Licensed Site Professional (LSP), Mr. Worthington has been responsible for technical quality, regulatory compliance, risk-based corrective action, and regulatory site closure at over 80 disposal sites in Massachusetts. Many of the projects that he has brought to closure were associated with time-critical real estate transactions, and Mr. Worthington has a track record of successfully communicating salient technical issues to stakeholders. As a Senior Hydrogeologist, Mr. Worthington has evaluated ground-water flow, subsurface contaminant transport, aquifer mechanics, and remediation strategies at numerous sites. He serves as a senior technical resource to project managers and staff geologists and engineers on a variety of site assessment and remediation projects.

Registrations & Professional Affiliations

- Licensed Site Professional-MA (1993)
- Licensed Environmental Professional-CT (1996)
- Certified Geologist-Maine (1991)
- Professional Geologist-Pennsylvania (1995)
- Massachusetts Licensed Site Professional Association (MLSPA)
- Environmental Professionals of Connecticut
- National Ground Water Association (NGWA)

Fields of Competence

- Hydrogeologic and geophysical investigations
- Site assessment and remediation
- Glacial geology
- Brownfields redevelopment, landfill emphasis
- Environmental due diligence
- Airline environmental program management

Education

- B.S., Geology/Physics, Stephen F. Austin State University, 1983
- M.S., Hydrology and Water Resources, University of Arizona, 1987

Publications

“Effects of channel stabilization in Tucson stream reaches on infiltration and ground-water recharge,” prepared for Pima County Department of Transportation and Flood Control District, 1986

“Thermal anomalies and the ground-water flow system south of The Narrows, Upper San Pedro Valley,

Arizona", 1987, Master's thesis, University of Arizona, 1987.

"Dating gasoline releases using ground-water geochemical analyses: case studies", Proceedings of the 1993 Petroleum Hydrocarbons Conference, Houston, Texas, 1993.

Key Projects

Ground-Water Supply Investigations Projects

Project Manager for multi-disciplinary studies to locate high yield water-bearing bedrock fractures in Weston, Massachusetts. Coordinated borehole, crosshole, and surface geophysical methods to trace a fracture system towards Town-owned land.

Program Hydrogeologist for the investigation of a potential municipal water supply aquifer in Weston, Massachusetts. Designed and conducted exploration program and pump tests and analyzed data by analytical and computer modeling techniques.

Project Manager of a comprehensive study of the safe yield of all aquifers in the Town of Marshfield, Massachusetts. Developed and quantified water budget equations for drainage basins in the town. Developed five computer models to simulate safe yield aquifer conditions and characterized the potential for salt water intrusion in coastal aquifers using calibrated flow models.

Conducted a ground-water adequacy investigation near Benson, Arizona. Included aquifer tests, two of which were for an artesian aquifer, requiring the design and construction of special hydraulic testing equipment. Other work included mapping piezometric configurations over a 300 mi² area. A computer model was developed, calibrated, and used to simulate future exploitation of ground-water resources.

Aquifer Protection Studies

Project Manager for a wellhead protection study of five municipal wells in Marshfield, Massachusetts. Calculated Zone II (zone of capture) using analytical and numerical techniques in accordance with Massachusetts DEQE guidelines. Work involved collection and

analysis of town-wide pump test data, drilling, aquifer mapping, and development and calibration of three ground-water flow models.

Project manager of wellhead protection study of five aquifers in Weston, Massachusetts. Utilized analytical techniques to determine zones of capture. Assisted Town officials with drafting and implementation of aquifer protection district bylaws.

Hydrogeologic Engineering Investigations

Project Hydrogeologist for a wastewater discharge siting study at Otis Air Base on Cape Cod. Hydrogeologic analysis included water table contouring, slug testing, flow net analysis, design, performance and data analysis of a five-day pumping test, an assessment of aquifer tidal response and salt water intrusion. Total project budget exceeded \$1 million.

Senior Hydrogeologist for a dewatering project in Beirut, Lebanon for a deep foundation set in a highly transmissive karst limestone formation. Evaluated construction contractor tenders for dewatering to review applicability of cutoff methods including diaphragm walls and permeation grouting.

Conducted hydrogeologic investigation of a proposed 70,000 gpd subsurface wastewater discharge facility in Lanesborough, Massachusetts. Participation in this project included field collection of seismic refraction data, assessment of hydrogeologic impacts of the discharge facility and writing the EIR draft.

Conducted hydrogeologic investigations for a proposed Superconducting Super Collider (SSC) site in Mississippi. Investigated water-supply and dewatering/tunneling aspects of the state's SSC proposal.

Hydrogeologic Research

Prepared detailed guidelines for the prediction of coal fly ash disposal site performance and subsequent protection of ground-water quality for the Electric Power Research Institute. Work included model evaluation and selection, contaminant transport modeling, sensitivity analysis, and report preparation.

Prepared procedural guidelines for monitoring wells used by the Massachusetts DEQE. Reviewed acceptable techniques of in-situ permeability testing for DEQE's Standard Operating Procedures.

Performed hydrogeologic interpretation of thermal anomalies in a multi-aquifer ground-water flow system in Arizona. Work involved detailed characterization of regional and local hydrogeologic conditions and the formulation and testing of hypotheses to explain observed ground-water temperature anomalies. Developed a model explaining the area's coupled ground-water and heat flow systems.

Utilized a numerical saturated/unsaturated ground-water flow model to determine the effects of river-bank stabilization on aquifer recharge. Adapted microcomputer graphics software to UNSAT2 output files to obtain contour plots of hydraulic head and degree of saturation for various recharge scenarios.

Developed microcomputer software that converts lengthy output files from the USGS three-dimensional ground-water flow model (MODFLOW) into contour plots of drawdown and hydraulic head.

Providing peer review to USGS for their pneumatic vapor flow modeling enhancement package for MODFLOW computer code. Tested model under various vapor extraction scenarios.

Aquifer Testing and Hydrogeologic Analysis

Designed and performed 5-day pumping test at Otis Air National Guard Base in Bourne, Massachusetts.

Prepared specifications regarding monitoring well and pumping well design, equipped wells up to 2,500 feet from pumping well with pressure transducers, sited and water discharge location, performed step-drawdown tests, and oversaw pre-test monitoring, 5-day pumping test (300 gpm discharge rate), and post-test recovery monitoring. Performed analysis of tidally affected groundwater elevation data and calculated aquifer hydraulic parameters using analytical and numerical techniques.

Performed 8-hour pumping test of 1,500-gpm irrigation well in Benson, Arizona. With minimal resources, used kinematics to calculate discharge rate and collected

groundwater elevation data using Stevens analog chart recorder. Calculated aquifer hydraulic properties using analytical techniques.

Performed 24-hour pumping test of artesian wells in Benson, Arizona. Designed and constructed mercury U-tube manometer to record artesian pressure head data, and calculated aquifer hydraulic properties using analytical techniques.

Performed step-drawdown tests and 24-hour pumping tests of LNAPL-contaminated aquifers in Mattapoisett and Acton, Massachusetts for a major oil company. Analyzed data and prepared capture zone analyses for use in groundwater recovery remedial systems.

Performed step-drawdown test and 8-hour pumping tests of residential wells in Westbrook and Tenants Harbor, Maine. Calculated aquifer hydraulic properties using analytical techniques.

Performed slug tests at multiple LNAPL-contaminated sites in Massachusetts, Connecticut and Maine for a major oil company.

Performed slug tests at a former bulk oil terminal in Fall River, Massachusetts. Used pressure transducer and dataloggers to record tidally affected groundwater elevations, and used analytical techniques to evaluate aquifer tidal response.

Performed flow net analysis of hydrogeologic systems at multiple sites in New England to evaluate contaminant transport, remedial strategies, and spatial variability of aquifer hydraulic properties.

Taught short courses and gave presentations on aquifer testing techniques to law firms, major oil company clients, and university students.

Used available boring logs and an understanding of continental glacial depositional processes to prepare hydrogeologic cross sections and site conceptual models at numerous sites in New England.

Performed dye tracing studies to evaluate subsurface conditions at sites in Massachusetts, Maine and Pennsylvania.

Thomas Weissinger, P.E.



Mr. Weissinger has 15 years of experience in environmental compliance management and auditing for small to large industrial facilities, including projects in air, water, wastewater, hazardous and non-hazardous waste, oil and chemical management, and TSCA/PCBs.

He has eight years of multi-media compliance experience, including managing the environmental engineering and laboratory staffs at a large aluminum smelter. There he implemented two MACT rules, a Title V permit, and a major update to the NPDES permit, among other compliance issues. He also coordinated the ISO 14001 certification of the plant's environmental management system and worked through various air and wastewater treatment system improvements.

Registrations & Professional Affiliations

- Professional Engineer, Maryland
- Member of Air and Waste Management Association

Fields of Competence

- Air emissions inventories
- New Source Review permitting
- Compliance and EMS audits
- Wastewater permitting
- Wastewater treatment troubleshooting
- Spill/Contingency Plans
- Air conformity

Education

- M.S., Environmental Engineering, University of Maryland, 2001
- B.S., Chemical Engineering, Georgia Institute of Technology, 1991

Publications

Weissinger, Thomas R. "Environmental Modernization of a Horizontal Stud Soderberg Plant." Light Metals 2000, Proceedings of the International Symposium on Light Metals, August 20 - 23, 2000.

Weissinger, Thomas R., and Girovich, Mark J., "Evaluation of a Chemical Stabilization Process." Remediation, Winter 1994/1995, pp. 77-99.

Key Projects

Managed all elements of environmental compliance at an aluminum smelter, including developing plant environmental goals, implementing environmental plans for continuous improvement, developing the environmental training program, managing the incident management system, coordinating and conducting internal audits, and managing all environmental compliance monitoring and reporting requirements for air, water, waste, petroleum and hazardous substance tanks, spills, and PCBs.

Prepared the air sections of Environmental Review Documents, operating conditions and legal testimony for two proposed coal barge unloading facilities at coal-fired power plants and a landfill gas-to-energy plant, both in Maryland. The work was completed in support of the State's review of the plants' Certificate for Public Convenience and Necessity (CPCN) applications. Work involved air emission estimates, regulatory applicability review, hazardous air pollutant (HAP) and air toxics analyses, and developing/negotiating license conditions acceptable to the sites and the State. Key regulatory issues evaluated include: New Source Performance Standards (NSPS) for coal preparation, non-metallic mineral processing, and diesel engines, New Source Review, and State-only air regulations.

Prepared the environmental feasibility and regulatory portion of a "Boiler MACT" alternatives analysis for the coal-fired boilers at two cigarette plants in Virginia. Updated the air emissions inventories to include mercury, other hazardous metals and hydrogen chloride (HCl) emissions under various fuel characteristics. Developed a scope of services for the stack testing to determine actual emissions of mercury, HCl, and particulate matter. Evaluated various non-capital or low-capital compliance options, including purchasing steam, fuel switching, the health-based compliance option involving the determination of allowable HCl emissions based on stack parameters, emissions averaging and compliance through fuel analysis.

Prepared minor source air permit applications for various sources including a hot-mixed asphalt plant, a sludge dryer, paint booths, a web printing facility, emergency generators, a pharmaceutical plant, and manufacturers of electronic components, solar cells,

motors and steel cans. For facilities in Maryland, the applications require an air toxics analysis involving developing an air toxics inventory and for each toxic either demonstrating that emissions are below allowable emission rates or calculating fence line concentrations for comparison to screening levels.

Completed air permitting and New Source Review (NSR) applicability evaluations for both non-attainment NSR and prevention of significant deterioration (PSD) at various facilities, including manufacturers of primary and secondary aluminum, extruded polymer foam, printed PVC film, printed circuit boards, and electronic devices, and a chemical laser research and development firm.

Submitted applications for Title V permits and permit modifications at two aluminum smelters, a large steam heat supplier with coal-, oil-, and gas-fired boilers and a glass frit manufacturer. At the aluminum smelters, implemented new compliance management systems that met the requirements of the permits, including the requirements of the new Primary and Secondary Aluminum MACT standards.

Completed other air-related compliance requirements for various clients, including a Compliance Assurance Monitoring (CAM) Plan and a baghouse maintenance plan for a coal-fired power plant and annual air emission certifications for various industries.

Prepared an air conformity analysis for an LNG facility proposed in the mid-Atlantic region. Made air emission estimates for all aspects of the project, including construction equipment, on-road mobile sources, stationary sources, and ships. Evaluated air permitting applicability of the ships, and prepared an air emissions offset analysis for NO_x, VOCs, SO₂, and PM_{2.5}.

Conducted environmental compliance audits at various industrial facilities (chemical, aluminum, metal fabrication, galvanized piping, colorants/dyes, adhesives, cement, wire coating, printing, vinyl film, battery recycling/lead smelting and electronics) in California, West Virginia, Maryland, Pennsylvania, Virginia, Ohio, New York, Missouri and Georgia.

Managed environmental compliance audits at two international agricultural formulation plants in Pakistan

and Indonesia. Planned the audits, led pre- and post-audit conference calls between the facilities, ERM's local audit teams, and the corporate environmental contact, and reviewed/approved the audit report for submission to counsel.

Conducted a due diligence document review of material liabilities for the purchase of a food products manufacturer with seven facilities around the world, and a chemical plant in Pennsylvania.

Completed Phase I environmental site assessments on various industrial and commercial facilities, including two sodium silicate manufacturers (with a full environmental compliance evaluation), a 400-acre farm once used for ordinance testing and disposal, a firebrick manufacturing plant, and university dormitories.

Managed the corrective actions resulting from a multi-media compliance assessment at an electronic device manufacturer in Virginia. Conducted an air emission inventory to document the facility's exemption from air permitting requirements. Coordinated the completion of hazardous waste management training, SARA 311 and 312 submittals, a Notice of Intent (NOI) submittal, and a Storm Water Pollution Prevention Plan, and revision of the Toxic Organic Management Plan, Discharge Slug Plan, and Contingency Plan. Determined that the SPCC rules do not apply and that no additional materials were subject to Toxic Release Inventory (TRI) reporting.

Provided technical and compliance assistance for the installation of a \$150 million environmental modernization project involving the installation of improved emission capture systems, a dry and wet scrubber for fluoride, particulate matter, polycyclic aromatic hydrocarbons (PAH), and sulfur dioxide removal, and a wastewater treatment system for fluoride, PAH, and PCB removal.

Coordinated the development and certification of an ISO 14001 management system at an aluminum smelter. The project involved planning and coordinating the efforts of the implementation team, developing simple, web-based systems and implementation tools, developing the ISO training program, and conducting internal audits.

Completed a human health risk assessment for inhalation of HF, COS, benzene, and PAHs at an aluminum smelter. The project involved estimating emissions, modeling short- and long-term concentrations, and determining the cancer and non-cancer risks associated with the emissions. The work plan for the project was negotiated with the NYSDEC, NYSDOH, and a local Native American Tribe.

Submitted applications for, negotiated, and received two new NPDES permits and various modifications covering process water, treatment system and stormwater discharges.

Prepared and/or certified oil spill prevention, control and countermeasure (SPCC) plans for eight different industrial facilities. Advised clients of updated requirement and recommended equipment or procedural modifications to attain compliance.

Evaluated applicability for stormwater permitting and developed stormwater pollution prevention plans for a variety of industrial facilities. For one large research and development campus, performed a physical inspection of the campus looking for non-stormwater sources discharging to stormwater drains. Advised the client on permitting options, including means for eliminating non-stormwater sources, allowing coverage under the general stormwater permit.

Prepared a pre-treatment permit application for a solar cell/semi-conductor manufacturing facility subject to federal pre-treatment standards. Evaluated wastewater generated, developed specifications for a neutralization system, and estimated discharge characterization. Negotiated favorable permit conditions from both the State and the County wastewater agencies.

Worked with Plant teams to troubleshoot and specify modifications for wastewater treatment systems involving aerobic treatment, chemical precipitation (fluoride, aluminum, and cyanide removal), thermal hydrolysis (cyanide removal), settling, filtration, carbon treatment (PAH and PCB removal), and oil/water separation.

Gary M. Keating



Mr. Keating has over 18 years of diversified environmental regulatory compliance experience as both a state regulatory official and as an environmental consultant.

Mr. Keating's environmental consulting experience includes multi-media environmental regulatory compliance auditing; compliance management system development; air program Operational Flexibility Plans; air emission permitting (Title V and minor source); air emission control evaluation; emission source testing oversight; clean air act implementation and training; Reasonably Available Control Technology (RACT) evaluations; industrial wastewater and storm water permitting; environmental liability/property transfer assessments; hazardous waste characterization and remediation; above ground and underground storage tank compliance; underground storage tank removal oversight; spill prevention control and countermeasure (SPCC) plans; asbestos surveys; and asbestos abatement oversight.

His regulatory agency experience includes technical evaluation of permit applications to construct and operate industrial, commercial, and institutional air pollution sources; ensuring regulatory compliance with all applicable state and federal pollution control requirements by developing permit terms and conditions that establish operational guidelines and allowable emission rates; conducting physical inspections of air pollution sources and their control equipment; observing and evaluating stack emission tests; providing technical support for litigation; directing ambient air monitoring studies to assess the impact of specific air pollution sources on air quality.

Registrations & Professional Affiliations

- ISO 14000 Registration Auditor - Advanced ANSI/RAB EMS Auditor Course (Certificate)

Fields of Competence

- Air Quality Regulatory Compliance
- Compliance Auditing
- Title V Permitting
- ISO 14000 Auditing and System Development
- Environmental Regulatory Compliance Management
- Environmental Liability Assessment

Education

- B.S. Environmental Engineering Technology (minor in Industrial Engineering Technology), University of Dayton, Ohio, 1987

Key Projects

Project Manager for the development of Title V applications with all requisite components for numerous ceramics, pharmaceutical, surface coating and glass manufacturing facilities located in New York and two Co-generation facilities located in New Jersey.

ISO 14001 assessments for a variety of operations in the manufacturing, pharmaceutical, automotive, and semiconductor business sectors.

Project Director in the compilation and development of all requisite components of a Title V application package at a major primary aluminum reduction facility. Project includes review of operational flexibility, applicable requirements analysis, and compliance monitoring terms.

Project Director for the implementation of compliance programs associated with the Pharmaceutical MACT Standard for a large pharmaceutical manufacturing facility.

Air program permitting for construction of a major manufacturing facility at a "green-field" site. The permit involved "major" nonattainment New Source Review issues (emissions offsets, LAER, etc.), and case-by-case MACT determination under Section 112g of the Clean Air Act.

Coordinated and implemented a major air emission compliance effort at a large surface coating facility. Activities included a site wide emission inventory; permit to construct application preparation establishing "synthetic minor" status in terms of the Federal Prevention of Significant Deterioration (PSD) program; an applicability determination regarding USEPA gas/gas and liquid/gas capture efficiency test methods; oversight of multiple source tests; ventilation system evaluation; federal and state regulatory analysis; and client representation during regulatory agency negotiations.

Project Manager for the development of a Title V Permit application and compliance initiatives at a large photographic product manufacturing facility that is

comprised of 6 square miles of manufacturing property and over 30 operating divisions.

Multi-media compliance auditing for a wide variety of industrial facilities including aerospace, photographic film, pharmaceutical, organic and inorganic chemical manufacturing, power generation equipment production, and utilities.

Conducted numerous MACT Standard applicability determinations and developed compliance strategies for affected sources for a wide variety of source categories. Served as Task Manager in the development of a HAP emission source survey in response to USEPA's §114 information request.

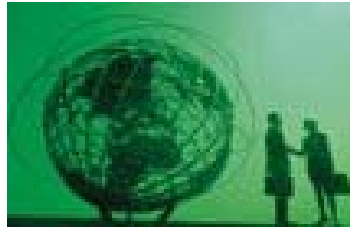
Developed VOC RACT compliance plans for submission to the New York State Department of Environmental Conservation for a variety of facilities including a major pressure sensitive tape surface coating and graphic arts manufacturer, a steel fabrication facility, and a primary aluminum reduction plant.

Project Manager for the development of a NO_x RACT Alternative Emission Limit Request for a New Jersey Co-generation facility.

Project Manager for the development of a VOC and NO_x RACT analysis and plan prepared for a petroleum refinery. This project included presumptive RACT applicability analysis; process evaluations; available control technology identification; technological feasibility and economic reasonableness determinations.

State regulatory official responsible for writing permits, inspecting and overseeing compliance efforts for all of the following air pollution sources: utility power plants; surface coating operations for a wide variety of substrates; ferro alloy manufacturing; solvent degreasing; above and below ground storage tanks; gasoline dispensing; petroleum bulk plants; and petroleum terminals; chemical manufacturing; plastic reinforced fiberglass production; lime manufacturing; asbestos brake shoe fabricating plants and asbestos disposal landfills; fly-ash disposal sites; infectious waste incinerators; solid waste incinerators; calcium carbide production; and dry cleaning facilities.

Carol A. Young, P.E.



Ms. Young has experience with numerical modeling; statistical analysis of natural systems; CWA compliance including Section 401, 404, 303 issues; NPDES permitting and compliance; TMDL analysis; Waste Load Allocation; point source and non-point source controls; Water Resources Development Act (WRDA); surface water quality; TRE; BMPs; hydrologic statistics; statistical analysis and stochastic model development; numerical model development; water quality, hydrologic and hydrodynamic modeling; fate and transport of contaminants in aquatic systems; WASP/DYNHYD; CORMIX; HEC-1,-2,-3,-4,-5 and -6; AGNPS; QUAL2E-UNCAS; RIVMOD; PGESTUARY; CEQUAL-W2; HSPF; TR-20,-55; SNTMP; and others.

Registrations & Professional Affiliations

- Licensed Professional Engineer: Virginia, Maryland

Education

- University of Virginia, Charlottesville, VA - MS Civil Engineering, 1991
- University of Massachusetts, Amherst, MA - BS Civil Engineering, 1984

Key Projects

Senior Engineer, Crown Landing LNG Import Terminal, New Jersey - Deputy Project Manager and Engineering Coordinator for BP's proposed LNG import terminal along the east coast of the United States. Responsible for coordination with design engineer, marine engineer, safety and security staff, dredging analysis, and lead author for engineering and physical science reports for FERC application. Responsible for overall engineering and science coordination, and CP scheduling. Coordinated and provided expert advice on significant project modifications for cost and schedule savings. Developed all stormwater, hydrologic and earthwork evaluations. Provided technical support for alternative site screening and navigation analyses. Developed permitting needs analyses and schedules. Coordinated air permitting evaluation. Coordinated all marine survey investigations including side scan, bathymetry, mag, and benthics, sediments, and dredging. Evaluated navigation and marine facility impacts.

Senior Engineer, LNG Import Terminal - Engineering lead and engineering and science coordinator for an LNG import terminal feasibility assessment in the Mid-Atlantic region. Developed navigation and dredging needs analyses. Coordinated site development requirements with site remediation.

Senior Engineer, LNG Import Facility Texas/Louisiana - Provided dredging, navigation, water quality, sediment transport, regulatory compliance and FERC documentation for a major LNG import terminal in Texas for ExxonMobil.

Project Manager of Chesapeake Bay Environmental Assessment of transportation ports and channels for Maryland Environmental Services and the Maryland Port Administration responsible for dredging of the Baltimore Harbor and access channels. Responsible for all aspects of analysis and assessment, including water quality, fisheries, benthics, economics (including transportation and port profitability), NEPA, Section 404 and 401 processes, permitting needs, and disposal options assessment.

Project Manager Beneficial Uses of Dredged Material program for Maryland Port Administration and U.S. Army Corps of Engineers. Examined feasibility of and alternatives to expansion of existing CDF. Alternatives considered were wetlands creation, land application, shallow-water habitat restoration and other beneficial uses of dredge material. Also assessed redefinition options for contaminated material to reduce demand on CDF and allow greater flexibility for beneficial uses and reduce disposal costs.

Project Engineer, Dredging options feasibility study at two reservoirs in South Carolina - Conducted engineering feasibility and NPV analysis on 20 different options including dredging and capping to determine lowest cost at least risk option for sediment management.

Bayer Corporation, Texas - Managed CORMIX computer modeling evaluation of alternate diffuser locations for Bayer's Baytown facility in Galveston Bay, TX for NPDES permit. Assessed three separate diffuser locations for the plant's waste discharge stream under a wide range of ambient and discharge conditions and negotiate a mixing zone with the state regulators. Determined effects and compatibility with navigation interests.

Senior Engineer, Superfund Site RI/FS analysis for NPL PCB-contaminated site in major lake/ river system in Georgia

and South Carolina - Reviewed all water quality, sediment quality and fate, and transport modeling of PCB contaminated NPL site. Demonstrated biodegradation of PCBs in a natural environment. Developed low-cost alternative to intrusive and costly remedial alternatives largely based on demonstrated biodegradation of PCBs and an analysis of the food chain/body burden relationship of contaminated fish and risk associated with consumption. Saved client nearly \$750 million. Developed alternative cost and efficacy analysis and restructured ARAR rankings.

Project Engineer, Dredged Material characterization and treatment options, Port of Oakland, Oakland, California - Assessed costs and effectiveness of various disposal options including CDF and wetlands creation.

Senior engineer/hydrologist - Maryland-National Capital Park and Planning Commission statistical model development for land use planning and decision-making for Potomac Sub-Region and Trville Development - Used GIS and planimetric data and habitat indices to develop a statistically-based watershed model. Performed least square multiple and partial regression, T-test, principal components analysis ANOVA, covariance testing, transformed data modeling, F-test, confidence and prediction intervals. Paper in press.

Aberdeen Proving Ground Carrying Capacity Study and Model Development, MD - Technical director for carrying capacity study to implement Integrated Natural Resources Management Plan (INRMP) for the facility. Focus is on determining what, if any, thresholds exist for various resources and developing predictive tools to project effects of facility projects, master plans, and mission on specific resources. Resources modeled include habitat, surface waters, wetlands, air quality, groundwater, and cultural resources.

Senior Engineer, Odenton Town Center, Odenton, MD - Stormwater management analysis, analysis of topographic and soil constraints on development. TR-55/-20 modeling. Integration of Rt. 32 highway engineering with Town Center.

Senior engineer, U.S. Postal Service NEPA EA, Morgantown, WV - Evaluated transportation impacts of relocation and expansion of Carrier Annex functions. Performed LOS analysis and route efficiency analysis. Evaluated applicability of AASHTO signal warrants and accessibility of throughfares and access roads for AASHTO WB-50 and WB-60 semi rigs. Evaluated noise impacts of the facilities on sensitive receptors stormwater management systems design, erosion and sediment control plans, subdivision design, traffic circulation, parking needs analysis, access restrictions, and septic/sewer and well/municipal water supply engineering and cost analysis.

Project Manager, Virginia Beach Water Supply Project, North Carolina and Virginia - Technical coordination and evaluation of hydrology of Roanoke River Basin, groundwater quality, treatability, and well safe yield analysis for southeastern Virginia, water quality impact analysis and hydrologic budget analysis for watershed-wide impact assessment.

Senior Engineer, RI/FS Evaluation OU2, Lake Hartwell, South Carolina - Evaluated sediment quality and biodegradation evidence of PCBs in natural environment, evaluated engineered stabilization and treatment alternatives, including landfilling of contaminated sediments, selective dredging, capping, and natural degradation; evaluated sediment water interaction modeling and geochemical lab data.

New York Power Authority, St. Lawrence River, NY - Developed QUAL2E model to simulate and assess water quality and in-stream habitat impacts of proposed spill program from Long Sault Dam as part of the re-licensing of the St. Lawrence-FDR Hydroelectric Project on the St. Lawrence River.

Senior Engineer, Fort Meade Watershed study, Fort George G. Meade, MD - Directed multidisciplinary team of engineers, planners, biologists, ecologists, and geomorphologists for detailed investigation of existing watershed condition and driving processes. Developed mitigation measures and costs for implementation. Developed supplemental hydrologic analysis to enhance existing TR-20 modeling that fails to adequately predict

critical high frequency events which drive primary channel configuration and stable channel bed configurations.

Residential and commercial development - Senior engineer in charge of surveys, site engineering, subdivision design, traffic circulation, parking needs analysis, access restrictions, septic/sewer and well/municipal water supply engineering and cost analysis.

Project Manager and Senior Engineer, Independence Park Industrial Park, MA - Planned development of more than 3,000 acres of industrial and mixed use land in coastal community. Responsibilities included oversight of all propertyline, detail, and topographic surveys; stormwater management designs, roadway design and circulation analysis; earthwork analysis; TR-20/ -55; water supply needs and analysis of impact on municipal systems; sewer layout and cost/ benefit analysis of on-site systems or package systems vs. extension of municipal services; wetlands delineations and recovery of lines; permitting; and oversaw construction.

Kempton Mine Acid Mine Drainage (AMD) remediation demonstration project, MD for Maryland Power Plant Research Program (PPRP) - Performed detailed statistical analysis of pre-, during, and post-grout injection data to determine effectiveness of use of coal combustion by-products on various metals, metals species, and acidity of mine drainage.

Senior Engineer, Natural Gas Pipeline Projects, Various Locations, East Coast, USA - Developed engineering plans and all permit packages for interstate transmission line upgrades and construction for a major natural gas provider in accordance with local, state, FERC and DOT requirements. Developed construction documents, provided field inspection and oversight. Assisted client with environmental compliance for all projects. Assisted client with land transfer and zoning issue resolution. Developed alternatives and cost saving measures for reroutes. Developed stream, floodplain and river crossing plans and application packages.

Senior Engineer, Condit Environmental Impact Statement, WA - Performed engineering design analysis and

assessment, scheduling and costing evaluations of alternatives, water quality and hydrodynamics assessments, sediment transport (HEC-6) and fish passage designs. Evaluated dam removal alternatives. Directed habitat evaluation and species interaction analysis.

Senior Engineer, Sebago Lake Water Management Plan Environmental Impact Statement, Maine - Senior engineer and technical team coordinator for major EIS for alternative water level management plans for Sebago Lake in Maine. Issues involved water quality, erosion patterns, lake level management, recreation, riparian property, hydroelectric power generation, aquatic habitat, and wetlands.

Chemung River Basin, NY - Developed watershed assessment for the Upper Chemung Basin as part of a WRDA project for the U.S. Army Corps of Engineers. Evaluated watershed hydrology relative to water quality, channel condition and instream and riparian habitat. Performed time series assessment to evaluate natural meteorological hydrologic patterns and compare with induced effects of flooding, erosion and accretion, and habitat loss.

Confidential Client, Ohio - Performed water allocation analysis for consumptive and recreational river use. Project involved calculating hydrologic, hydraulic, and water resources statistics to characterize a river and its seasonal variations. Evaluated TMDL and performed independent wasteload allocation for a variety of flow management scenarios using QUAL2E model.

Confidential Client, Cleveland Hopkins International Airport, OH - Provided surface water quality, stormwater and deicing agent management assessments for the proposed runway expansion project at Cleveland Hopkins. Assessed potential impacts to aquatic chemistry, effectiveness of mitigation measures, and hydrologic modification consequences of various runway alternatives. Evaluated wasteload implications of deicing activities on receiving water.

United States Air National Guard, various U.S. locations - Provided water quality, hydrologic and stormwater

management assessments at five ANG facilities across the United States. The assessments were in support of the required NEPA documentation for various airfield facility and operational plans. Facilities included King County Airport, Willow Grove Airport, Pittsburgh International Airport, and Andrews Air Force Base.

Marriott Distribution Services, Maryland - Managed bio-monitoring program for client to ensure compliance with facility's state discharge and NPDES permits. Developed and submitted to the Maryland Department of the Environment a Plan of Study for the program. Currently developing TRE for the discharge point to determine source and methods for eliminating aquatic toxicity.

Donana Mine, Spain - Performed soil loss analysis for an inactive mine tailings site in Spain. A USLE numerical model was used to determine the amount and temporal distribution of soil-associated metals contamination that would be discharged as a non-point source to the river from the tailings deposits. The analysis was then used to determine remediation and waste management alternatives.

Senior Engineer, Avtex Fibers NPL Site, Front Royal, VA - Evaluated stormwater management and site runoff allocation and treatment needs for in-progress remediation program for PRP (FMC). Value-engineering for reduction of treatment train flow to maximize redirection of un-contaminated discharge. Re-evaluation of "contamination" definition for direction to treatment facility.

Project Engineer, Dredged Material characterization and treatment options, Port of Oakland, Oakland, CA - Assessed costs and effectiveness of various disposal options including CDF and wetlands creation. Developed CDF simulation model to evaluate performance of metals during inflow and crust management phases.

Project Engineer, Dredging options feasibility study at two reservoirs in South Carolina - Conducted engineering feasibility and NPV analysis on 20 different options to determine lowest cost at least risk option for sediment management.

Traville Project, Stormwater and Nutrient Management Plan, Montgomery County, MD - Developed a site specific nutrient, hydrologic, and sediment load analysis for a proposed development in rapidly growing Montgomery County, MD. The primary concern was stream and wetland quality impacts from development. Developed a hydrologic balance scheme for the stormwater management plan that would mimic natural conditions between recharge, runoff, and evapotranspiration. Final designs included tradition detention/retention structures, wetlands, infiltration devices, and bioretention cells.

Elm Street Development, Easton Village, MD - Developed innovative stormwater management BMP designs to optimize nutrient management for a land use conversion from agricultural use to high density residential. Issues included nutrient sensitivity of the receiving tidal waters, recharge and nutrient attenuation in the soil column, and hydrologic alteration. The final project included some least cost bioretention/ detention and infiltration practices linked in series to provide nearly 100% nutrient removal.

Scott Dorris



Mr. Dorris has over 18 years experience in the environmental services arena. For two years, he worked for a major government utility company as an environmental scientist. For the last 16 years, he has worked in various consulting and management positions for two leading environmental management consulting firms.

His industrial experience covers such areas as petrochemical, oil and gas, forest products, aerospace, and stone/clay/cement.

Mr. Dorris is also a seasoned instructor having taught more than 1,000 students in various environmentally related classes over the last 10 years. As an instructor, Mr. Dorris has provided training in such areas as dispersion modeling, state and federal air permitting, air regulations, compliance management, strategic environmental management, and selecting environmental management information systems. His classes have always been extremely well received scoring high marks in overall effectiveness.

Registrations & Professional Affiliations

- Air & Waste Management Association

Fields of Competence

- State and federal air quality permit application preparation
- NSR applicability analyses
- Air quality dispersion modeling
- Accidental release modeling and expert testimony
- Air quality training
- Compliance management
- Information systems conceptualization
- Information system implementation
- Environmental management systems
- Ambient monitor siting
- Emissions inventory review and preparation
- Negotiating environmental agreements

Education

- B.S., Meteorology, Florida State University
- M.S., Atmospheric Chemistry, Georgia Institute of Technology

Publications

Soule, R., C. Meyers, C. Laffoon, J. Rinaudo, S. Dorris, R.L. Madura, L. Tober, and S.P. Pakunpanya, "Revising State Air Quality Modeling Guidance for the Incorporation of AERMOD - A Workgroup's Experience", Proceedings of the 99th Annual AWMA Meeting, 2006.

Dorris, S., "Strategic Environmental Management", Presented as a NAEM educational offering, Boston, MA, September 2003.

Dorris, S. "Embracing Global Solutions for EH&S," Seminar offered in 29 U.S. cities between March & May 2001.

Dorris, S., "Consideration of Information System Requirements for Title V Compliance", Presentation to Winter Conference AWMA, Dallas, TX, February 2001.

Key Projects

3M – St. Paul, Minnesota. Performed dispersion modeling analysis for 24 organic compounds from over 40 different sources. A culpability analysis was conducted to determine relative contributions from each source to the maximum predicted concentrations.

Alcoa - Louisiana Facility. Performed toxic air pollutant (TAP) modeling to estimate the off-property impact of several TAPs at Lake Charles Facility. A generic long-term and short-term model was used to estimate off-property impact. Results for different emission rates were to be extrapolated from the generic run results and used to support a certification of compliance submittal.

Boise Cascade Corporation - DeRidder Mill, Louisiana. Conducted historical compliance audit to determine if a "modification" had occurred at the lime kiln. The tasks involved were the assimilation of permit history information with emphasis on the lime kiln emissions, determining correlations between lime kiln scrubber pressure drop and emissions and determining PSD and NSPS applicability. Preparation of a permit application to reconcile the Thermo-Mechanical Pulp (TMP) Plant as an emissions source. This application accounted for an increase in TMP production and the installation of a turpentine condenser as a VOC control device. Performed an NSR applicability study to determine if increasing the number of cooks per day triggered PSD review. Preparation of a Title V permit application. Tasks included the characterization of all potential emission sources, creation of an air regulatory profile, completion of a comprehensive compliance audit and determined monitoring and operational flexibility requirements. Air dispersion modeling was performed to verify compliance with the AAS. Prepared a report and provided follow-up with the AAS Compliance Plan. Managed development of NCG reporting/recordkeeping system. This system was developed in Microsoft Access and was accessible to all required personnel. Managed New Source Review

analysis for proposed chlorine dioxide substitution project.

Boise Building Solutions - Florien Plywood Plant, Louisiana. Preparation of a permit application to implement their Annual Capital Plan. Determined which emission sources needed to be permitted, prepared the permit application and followed up the project with the LDEQ to issuance of the permit. Prepared state permit application. The facility proposed to upgrade the block conditioning capability to ensure a continuing supply of conditioning blocks to the lathes. Prepared PSD permit application for increasing steam to the facility. Prepared application, performed BACT analysis for the Bark Boiler, performed dispersion modeling for sulfur dioxide, carbon monoxide, nitrogen dioxide, and particulate matter.

Boise Building Solutions - Oakdale Plywood Plant, Louisiana. Preparation of a state permit application to implement their Annual Capital Plan. The facility proposed upgrading the #1 Veneer Dryer. Calculations were performed to determine PSD applicability and permit application was prepared. Determined which projects needed to be permitted, prepared the permit application and followed up the project with the LDEQ until issuance of the permit.

Cabot Corporation – Canal and Ville Platte Facilities, Louisiana. Developed initial Title V permit applications for both facilities. Developed emissions inventories, performed regulatory applicability analyses, performed dispersion modeling, and developed building downwash data. Performed toxic air pollutant modeling for Air Toxic Compliance Plan. Assisted in PSD strategy planning for ongoing and future projects. Prepared PSD permit application for proposed changes at Canal Plant including application package and PM₁₀ modeling for NAAQS compliance.

Cajun Electric Power Cooperative – New Road Power Plant, Louisiana. Performed NAAQS modeling analysis for sulfur dioxide for Big Cajun 2 Power Plant.

CF Industries, Inc. - Donaldsonville Facility, Louisiana. Managed preparation of the Title V permit application.

As part of the permit application, performed a detailed regulatory analysis to identify all applicable regulations. Prepared all Louisiana permit application forms in support of the Title V application. Managed preparation of minor modification and reconciliation permit application. Dispersion modeling for ammonia was performed as part of this effort.

Confidential Pulp and Paper Mill. Managed historical PSD audit of the facility. The analysis was performed for projects performed at the Mill back to 1977.

Confidential Pulp and Paper Mill. Managed historical PSD audit of the facility. The analysis was performed for projects performed at the Mill back to 1988.

Dow Chemical Company – Plaquemine Facility, Louisiana. Performed dispersion modeling analysis to estimate the maximum ground level SO₂ concentrations from the proposed turbine stacks. The maximum concentrations were used to estimate optimal stack heights.

Dynamic Industries – New Iberia, Louisiana. Performed an air quality analysis to assess the impact of several toxic air pollutants in support of a Louisiana air permit application.

El Paso Corporation – Various facilities, New Mexico and Texas. Prepared PSD and State of Texas permit applications for installation of new natural gas fired facility in El Paso, Texas. Performed air quality analysis, Best Available Control Technology (BACT) review, and analyzed impacts on visibility and soils. Assisted in the collection of ambient monitoring data. This effort included, monitoring firm selection, monitor siting, and development of the monitoring plan. Prepared a PSD and state of New Mexico permit applications for addition of a new turbine and an uprate of an existing turbine near White Rock, New Mexico. Because facility was located on an Indian reservation, Federal Land Manager concerns were addressed through EPA.

El Paso Energy – Various facilities, Mississippi and Louisiana. Preparation of updates to the Title V Operating permit applications for all facilities in

Mississippi and Louisiana. Developed state construction and Title V Operating permit applications for two greenfield compressor stations in Mississippi. Developed compliance summary for a Title V general permit for a Louisiana compressor station. Performed a New Source Review (NSR) analysis for a planned engine replacement for a compressor station in Louisiana. A state permit application was developed based on the results of the NSR analysis.

Entergy Services – Monroe Power Plant, Louisiana. Performed PSD dispersion modeling analysis for NO_x and CO as part of a re-powering project.

Entergy Services – R.S. Nelson Electric Generating Station, Westlake, Louisiana. Performed PM₁₀ modeling analysis to support initial Title V permit.

ExxonMobil Chemical Americas – Baton Rouge Chemical Plant, Louisiana. Performed modeling projects for several pollutants, including benzene, hexane, 1,3-butadiene, sulfuric acid and carbon monoxide. Prepared and submitted a PSD permit application for a planned expansion at the Phthalic Anhydride Unit. The proposed modification required a PSD review for CO and SO₂. This involved a “top-down” BACT analysis, an air quality analysis and an additional impacts analysis due to SO₂ (the only significant pollutant). A visibility screening analysis was also conducted for SO₂ as part of the additional impacts analysis. Performed n-hexane dispersion modeling analysis to demonstrate compliance with the Ambient Air Standards as part of a proposed permit modification. Prepared a permit application for a proposed modification to the methyl ethyl ketone manufacturing facilities. Netting allowed the facility to avoid PSD permitting. Prepared air quality analysis for hypothetical release of chlorine from a vessel fire. Analyzed impacts of site-wide sulfuric acid, benzene, chloromethane, and PAH emissions. Provide onsite support for environmental services covering all process units.

ExxonMobil Company USA - Baton Rouge Refinery, Louisiana. Performed a dispersion modeling analysis for a short-term release of SO₂. Modeling was

performed for an incinerator stack to support a variance request submitted to the LDEQ and worst-case, 3-hour and 24-hour ground level concentrations were calculated for comparison to the NAAQS. Performed air dispersion modeling analysis for SO₂ emissions from two incinerator stacks at the refinery. Modeling under three different scenarios was performed. Developed nonattainment review and preparation of a state permit application. The proposed project involved the addition of valves and pumps to a Light Ends Distillation Tower at the refinery. In addition, a process heater, heat exchanger and cooling towers were permitted. Preparation of state permit application for a proposed modification that resulted in increased emissions of reduced sulfur compounds including H₂S. PSD applicability analysis indicated that project did not trigger PSD. Preparation of a state permit application that involved modifying a tank at Maryland tank farm to blend gasoline and installing associated equipment. The controls installed on the tank resulted in an overall reduction in VOC emissions. Met with ExxonMobil representatives to discuss the environmental ramifications of the proposed projects. The primary issues of concern were the HCN, the Catalytic Cracking Unit and the Pipestill-10 projects.

Georgia-Gulf Corporation - Plaquemine Division, Louisiana. Performed air dispersion modeling analysis to estimate maximum ground-level concentrations of VCM from the existing PVC/VCM plant and the proposed CPVC plant. The modeling analysis was performed using the latest version of the ISC model. Preparation of a PSD permit application for installation of three new cogeneration units. Three gas turbines were installed to generate power for the facility. The exhaust gases from the turbines are used to generate additional steam. PSD review was performed for CO, NO_x, PM₁₀ and VOC. A detailed air quality analysis, BACT analysis and additional impacts analysis were performed as part of the PSD permit application preparation. Preparation of a state permit application to reconcile the PVC unit at the facility to include revised emissions and previously unpermitted sources.

Georgia-Pacific Corporation - Port Hudson Operations, Louisiana. Performed significance modeling in support of a PSD permit application for the construction of a new

recovery furnace. Performed air toxics dispersion modeling analysis for all toxics emitted and exceeding the Chapter 51 Minimum Emission Rate (MER). The modeling analysis was performed using the ISC3 model. All results were summarized in a report and will be submitted to the LDEQ.

Graphics Packaging International - West Monroe Mill, Louisiana. Performed dispersion modeling for toxic air pollutants that were emitted at a rate greater than the corresponding minimum emission rates. The status of compliance determined at the property line, with respect to the applicable ambient air standards. A dispersion modeling report was prepared detailing the methodology utilized and the results of the analysis. Finally, the AAS compliance plant/certification of compliance was prepared which incorporated the results of the air dispersion modeling analysis. Preparation of a PSD permit application for a proposed increase to the capacity of the No. 5 Recovery Boiler. Performed tasks related to emissions quantification, New Source Review applicability, PSD BACT review, Hazardous Air Pollutants identification and Control Technology Assessment, New Source Performance Standards Applicability Analysis and Air Dispersion Modeling Analysis. Prepared a Permit Application document for submittal to the LDEQ for review. Preparation of a response to Toxic Air Pollutant (TAP) Compliance Plan as required by the LDEQ. This consisted of providing the LDEQ with TAP emissions for all pollutants and sources in LDEQ specified formats and comparing the results to previous submittals.

Hawaiian Electric Company - Honolulu, Hawaii. Prepared the PSD permit application for the installation of a combustion turbine and black start generator at an existing Hawaiian Electric Company electric utility. Performed dispersion modeling for sulfur dioxide, nitrogen dioxide, particulate matter, carbon monoxide, and 15 toxic air pollutants. A Class I area impacts analysis and soils and vegetation analysis were also performed as part of the PSD project.

Hood Industries - Wiggins Facility, Mississippi. Managed modeling for PSD permit application for a new veneer dryer. Modeling was performed for NO_x, CO,

and PM-10. Also performed CALPUFF modeling to assess the impacts on the Breton Wilderness Class I area.

LaFarge – Midlothian, Texas. As part of PSD permit application, performed dispersion modeling for sulfur dioxide. Performed BACT analysis. Sited sulfur dioxide monitor.

Louisiana Pigment Company – Westlake Facility, Louisiana. Prepared a PSD application. The permit application included a netting analysis, all required modeling, a BACT analysis and filing of requisite forms. Managed the preparation of the annual emissions inventory for all sources. Prepared Title V permit application. Incorporated LP's current inventory, identifying unquantified sources of air emissions, performed a detailed regulatory applicability analysis and prepared Louisiana's Title V permit application forms. Managed modeling of PM and SO₂ as part of a PSD permit application. Managed preparation of an administrative amendment to re-route a stack at the facility. Performed PM-10 modeling for NAAQS compliance demonstration.

MeadWestvaco - DeRidder Facility, Louisiana. Performed a hypothetical release modeling analysis using the SCREEN3 model. The scenario involved a warehouse fire of paraformaldehyde and the resulting impacts of formaldehyde on the surrounding area. The results of the modeling were utilized to develop new safety protocols for the facility.

Prepared update to the pending Title V Operating permit application. Revised all of the emission calculations as part of this effort. Preparation of the update to the Air Toxic Compliance Plan including dispersion modeling of several toxic air pollutants.

Murphy Oil Company USA - Meraux Facility, Louisiana. Prepared PSD application to increase capacity of the FCC units. Preparation of a revision to the existing permit for the Meraux Terminal to meet the requirements of the Title V permit program. Performed dispersion modeling for proposed release at amine unit to establish a level that would be in compliance with the NAAQS for sulfur dioxide. Prepared permit application

for Clean Fuels project. This included emission inventory development, PSD netting, and regulatory compliance. Performed a dispersion modeling analysis for an accidental release of hydrogen sulfide associated with an outage at a flare stack.

Northrop Grumman – New Orleans Facility, Louisiana. Preparation of update to the pending Title V Operating permit application. Conducted site visit of entire shipyard to perform a compliance audit of the emission inventory. Updated all emission calculations. Performed dispersion modeling for PM₁₀ and three toxic air pollutants. Preparation of a small source permit for the Modular Construction Division. This application included a new paint booth and increased sandblasting capability.

Pennzoil - Shreveport Refinery, Louisiana. Preparation and submittal of a PSD permit application for a resin cat cracking project. A BACT review for a CO boiler, flare and two fuel gas boilers and a detailed netting analysis for CO, SO₂, NO_x, VOC and PM was prepared. As part of the air quality impacts analysis, atmospheric dispersion modeling was performed for CO for comparison to the PSD modeling significance levels. A MACT Review and atmospheric dispersion modeling for toxics to show compliance with the AAS was performed and permit was approved.

Placid Refining Company - Port Allen Refinery, Louisiana. Quantified all sources of toxic air pollutants regulated under Louisiana's Chapter 51 program and created the TEDI ASCII files. Performed dispersion modeling for nickel and antimony emissions. The results of the modeling were compared to the LA Ambient Air Standards. Performed an air toxics speciation to substantiate that Placid is a minor source of air toxics under Chapter 51 of the LAC. Managed calculations of VOC emissions reductions due to the addition of guide pole accessories to the refinery's external floating roof tanks. Calculation of Placid's baseline emissions with current roof fitting status was determined and VOC emissions from various roof-fitting scenarios were calculated to determine the appropriate scenario to reduce VOC emissions by 90 percent. Managed calculation of the creditable emissions

reductions as provided in LAC 33:III.Chapter 6. Calculated the VOC and NOx credits, completed the LDEQ's Emission Reduction Credits Banking Application form and provided supporting calculations. This was the initial ERC application to the LDEQ.

Prepared Title V permit application. Tasks included site visits to identify and characterize all potential emission sources, regulatory applicability analysis and determination of operational flexibility requirements. Prepared an amendment to the Title V permit application to allow Placid to modify the service of Tank 58 to include MTBE. Reconciled emissions from the vacuum gas vent system and modifying the Title V permit application to route the emissions to a different control device. Managed the preparation of the Annual Emissions Inventory update for submittal to the LDEQ. Calculated the emissions based on Placid's process rates and prepared the ASCII files. Prepared an update to pending Title V Operating permit application based on LDEQ formatting changes and Placid requested changes. A complete update to the regulatory analysis was performed. Prepared a small source permit modification for a tank that was demolished and replaced with a similar tank. Prepared variance request to inspect the ESP on the cat cracker. Modeling was performed to demonstrate that the Ambient Air Standards would not be violated over the 3-day period of the inspection. Managed regulatory review for MACT requirements.

Sasol North America - Lake Charles, Louisiana. Modeled sulfur dioxide emissions from a short duration upset condition at the facility. Demonstrated compliance with the short-term SO₂ standards. Modeled plant-wide sulfur dioxide and hydrogen sulfide emissions to demonstrate compliance as part of a permit application. Modeled four air toxics to demonstrate compliance with the AAS as part of a permitting project.

Shell Chemical Company - Geismar Facility, Louisiana. Performed a dispersion modeling and risk analysis for plant wide emissions of ethylene oxide and acetaldehyde. Provided general consulting for various NSR related issues.

Temple-Inland - Bogalusa Mill, Louisiana. Managed preparation of a Title V permit application. A comprehensive emissions inventory, regulatory applicability and compliance status analysis was performed. In addition, the operational flexibility and recordkeeping and reporting requirements were determined. Prepared PSD application for new washer. Included ambient monitoring for five criteria pollutants to demonstrate compliance with the NAAQS.

Prepared state permit application to permit relocation and expansion of the existing corrugated box plant. This included estimation of existing and proposed emissions, regulatory review and NSR analysis.

W.R. Grace - Lake Charles Facility, Louisiana. As part of a compliance order, Grace reduced particulate matter emissions on a facility-wide basis. Grace proposed to reduce particulate matter emissions more than was required by the compliance order. They wanted to bank the creditable reductions for future projects. In addition, they installed an additional ammonia scrubber that decreased ammonia emissions. Managed the preparation of the state permit application and the modeling of PM and NH₃ for compliance with Ambient Air Standards. Managed preparation of a PSD permit application for a proposed expansion. As part of the expansion, Grace proposed to add a new hydrotreating catalyst plant. Performed the required netting analysis, NSPS applicability, BACT analysis and Class I area impacts analysis in subpart of the permit application. Preparation of a state permit application for a proposed modification. As part of the permit application, performed the required netting analyses. Performed a dispersion modeling analysis for NO_x, PM, NH₃, Ni and HCl emissions. Performed PM₁₀ modeling using updated stack emission rates. Used ISC to model PM₁₀ and provided Grace with a summary of results in tabular and graphical format. Prepared air permit application new DA unit at plant. The New Source Review analysis included netting out for PM₁₀ and modeling for NO_x, PM₁₀, NH₃, and HCl. Compared PM₁₀ ISC3 modeling results to ISC-Prime and AERMOD.

Julia Tims



Ms. Tims has more than 15 years of experience in terrestrial ecology and natural resource management and environmental impact assessment. Julia has conducted environmental impact assessment and natural resources studies throughout the United States, South America, Africa, and Europe involving biodiversity assessment and management, wildlife and vegetation management, endangered species survey and management, and stakeholder engagement related to biodiversity and the interactions between biological and social issues. Julia has particular expertise in projects that combine technical ecological issues with project design, land management, and conservation planning for sensitive species and habitats. Mrs. Tims excels in coordinating diverse, large-scale projects throughout the United States and globally.

Registrations & Professional Affiliations

- American Ornithologist's Union
- Society of Wetland Scientists
- The Wildlife Society
- Waterbird Society

Key Industry Sectors

- Energy
- Infrastructure (transportation and pipelines)
- Oil and gas development
- Government (National and local)

Fields of Competence

- Environmental impact assessment
- World Bank/IFC policies and guidelines
- EIA/EIS project management
- Project permitting and documentation
- Ecological baseline studies
- Environmental management and monitoring
- Biodiversity assessment, management, and monitoring
- Stakeholder engagement related to biodiversity and biological/social interactions
- Interaction with environmental NGOs
- Habitat restoration and enhancement
- Endangered Species Act Section 7 Consultation
- Taxonomy of vegetation, birds, mammals, reptiles, and amphibians
- Project planning/design to address ecological issues
- Alternatives analysis
- Cumulative impact assessment
- Biodiversity offsets

Education

- M.S., Natural Resources Management/Ecology, Cornell University, 1999, With Distinction
- B.S., Entomology and Applied Ecology/Wildlife Conservation, University of Delaware, 1990
- Environmental Impact Assessment, Inter-American Development Bank
- Monitoring and Evaluation of Projects, Inter-American Development Bank
- OSHA 40-hr Hazardous Materials Handling and Safety Training

Publications

Tims, J.L., I.C.T Nisbet, J. Hatch, and C. Mostello. 2004. Characteristics and performance of Common Terns in Old and Newly-established colonies: implications for long term conservation. *Waterbirds*. 27(2):134-143.

Tims, J.L. and K.M. Brown. 2001. Food Items Obtained by Gulls at and Around JFK International Airport: Relevance to Airport Management. *Waterbirds*. 24(1): 44-52.

Tims, J.L. and K.M. Brown. 2001. Changes in the Nesting Populations of Colonial Waterbirds in Jamaica Bay Wildlife Refuge, New York, 1974-1998. *Northeastern Naturalist*. 45:17-28.

Key Projects

Environmental and Social Impact Assessment, Bui Hydroelectric Project, Ghana - Managed the biodiversity and natural resources impact assessment for the ESIA of the proposed Bui Hydroelectric Project in western Ghana. The project is highly controversial amongst Ghanians and national and international NGOs for biodiversity and social reasons: the project area has high biodiversity value and contains roughly 2,000 villagers that will require resettlement if the project proceeds. The ESIA is being conducted in accordance with World Bank/IFC policies and guidelines. ERM is conducting extensive stakeholder consultation throughout the ESIA process. The project involves identification and quantitative assessment of a "biodiversity offset" area

that will be included in the project as mitigation for inundation. This offset assessment is being conducted in consultation with an international NGO as part of a global pilot program for biodiversity offsets.

Environmental Impact Statement (EIS) for the PolyMet Mining, Inc., NorthMet Mine and Ore Processing Facility Project, MN - Currently providing senior technical oversight of ecological and wetlands issues for the EIS of the NorthMet mine and ore processing facility, which will produce copper metal and concentrates of nickel, cobalt, palladium, platinum, and gold. The project could result in extensive wetlands impacts and so involves close coordination with project design engineers and state and federal wetland protection agencies to minimize potential wetland impacts. The primary ore contains sulfides, which have the potential to produce acidic waste products. As such, the EIS focuses on evaluating potential environmental impacts from waste products and alternatives for waste management.

Environmental Impact Statement for the Clackamas Hydroelectric Project Relicensing, Portland, OR - Project manager for the EIS and technical leader for terrestrial ecological issues for relicensing the Clackamas River hydroelectric project. Since 1999, Julia has provided technical expertise within working groups and facilitated coordination among natural resource trustees on ecological issues. Key issues include the effects of the project on wildlife and habitat, threatened and endangered plant and animal species, habitat loss, habitat connectivity/fragmentation and wildlife movement, and establishment and spread of exotic species. Managed preparation of the Draft Environmental Impact Statement for the project as third-party contractor to the Federal Energy Regulatory Commission and facilitated interactions with PGE and the FERC regarding relicensing issues.

Cumulative Impact Assessment for the Camisea Gas Project, Peru, International Development Bank and Pluspetrol Peru Corporation - The Camisea Gas Project is the largest and most sensitive development project in Peru. As part of the ESIA for the project, Julia conducted a comprehensive cumulative impacts assessment on biological resources that could result from the planned

oil and gas developments and expansion of the Malvinas Gas Separation Plant, combined with other past and reasonably foreseeable future activities within the lower Urubamba watershed. The assessment identified the probability and magnitude of cumulative effects on habitat quality, biodiversity, rare species, and indigenous communities that rely on biological resources for sustenance fishing and hunting.

Initial Biodiversity Assessment and Planning (IBAP) Methodology, Conservation International Center for Environmental Leadership in Business Excellence - Conservation International (CI) invited Julia to contribute to the development of CI's Initial Biodiversity Assessment and Planning (IBAP) methodology, which was developed to assist companies in identifying and addressing biodiversity issues in their development projects. Provided technical advice on methods for rapid biodiversity assessment and shared practical experiences on how companies can institutionalize biodiversity issues into their corporate practices. The IBAP methodology is currently being field tested by several companies around the world and Julia continues to work with CI on the IBAP and the new biodiversity offset program. Julia is currently field testing the biodiversity offset methodology on a project in western Ghana.

East Iceland Sustainability Initiative, Iceland - Project manager and lead ecologist on a Sustainability Initiative for Alcoa's Fjardal aluminum smelter and Landsvirkjun's Karahnjúkar hydroelectric power station, located in East Iceland. These associated projects were two of the most controversial development projects in Iceland's history, with Icelandic and international NGOs opposed to the projects because of sustainability issues and the potential impacts of the projects on Iceland's biodiversity. Alcoa and Landsvirkjun selected ERM to coordinate a Sustainability Initiative that would help the companies integrate sustainability practices into the Fjardal and Karahnjúkar projects. The Initiative resulted in a set of indicators and metrics that will be used to measure the future performance of the projects at meeting sustainability objectives, including protection of biodiversity. The initiative was considered a great success by both companies and by the Stakeholder

Advisory Group, and is being used as a model for other international sustainability initiatives.

World Bank Group Environmental and Social Operations Assessment for Ferrocarril Transandino S.A. and PeruRail S.A., Peru - Provided senior technical review of the assessment regarding Ferrocarril Transandino S.A. and PeruRail S.A.'s operational adherence to World Bank Group policies and guidelines. The companies recently applied for IFC funding to support capital investments in the upgrade of the Peru railway network and the proposed Cerro Verde Project, which entails transporting copper concentrate from the Cerro Verde mine by truck and rail to Matarani Port. The assessment determined that several aspects of the companies' existing and proposed future operations did not adhere to World Bank Group environmental, social, and health and safety policies and guidelines. The assessment identified several social and environmental operational and maintenance procedures that do not currently meet WBG policies and guidelines and recommended action plans for the companies to reach compliance.

Framework for Corporate Social Responsibility in El Salvador: Development of Environmental Guidelines in the Sugar Sector - Provided senior technical review of the CSR framework and environmental guidelines for El Salvador's sugar sector. The government and the Minister of Economy of El Salvador requested the Foreign Investment Advisory Service (FIAS) and Business for Social Responsibility (BSR) units of the World Bank to assist them in designing and implementing a coherent Corporate Social Responsibility (CSR) strategy for the country. On behalf of the World Bank, ERM prepared the CSR and developed environmental guidelines to integrate responsible and sustainable practices into the country's overall development and competitiveness strategy, and to develop a framework for public-private partnerships in a range of social and environmental areas of concern.

The project involved a six stage process: collecting and assessing environmental, health and safety data related to El Salvador's sugar sector; identifying local and international regulations that apply to the sector;

devising a performance measurement and verification system appropriate for the sugar sector; developing self-assessment diagnostic tools; developing guidelines for transparent reporting; and applying lessons for remediation and capacity-building.

Environmental, social, and health assessment of Ecoelectric S.A. cogeneration facility and Valdez sugar mill, Ecuador - Provided senior technical review of the 36.5 MW bagasse fired cogeneration project proposed by Ecoelectric S.A. The project is located within the Valdez Sugar Mill in the southern coastal region of Ecuador.

Ecoelectric applied to international lenders, including the Andean Development Bank (CAF), the DEG (member of KfW banking group), and the Corporación Interamericana para el Financiamiento de Infraestructura, S.A. to provide a loan to support the construction of a 27.5 MW boiler. ERM reviewed the environmental, health and safety conditions of the project and sugar mill and developed a Corrective Action Plan (CAP) to mitigate potential environmental, health and safety, and social impacts of the proposed project. With successful implementation of the CAP, the proposed project will meet Ecuadorian laws and standards as well as the applicable IFC/IIC environmental, social, and health and safety policies and guidelines.

Environmental Impact Assessment for Sea Launch, French Polynesia - Led the biological impact assessment for a sea-based, mobile launch facility for placing payloads in orbit from the Pacific Ocean. Evaluated project-specific and cumulative impacts associated with launches from the Pacific that track along the equator and through French Polynesia. Specifically evaluated potential effects on coral ecosystems and marine, island, and continental ecological communities including threatened and endangered species in Central America and the Galapagos Islands.



Mr. Willey has approximately seven years' experience in ecology and natural resource management with specific expertise in wetland, aquatic and estuarine ecology, and has evaluated freshwater, estuarine and wetland biological communities in several states on the Atlantic, Pacific and Gulf Coasts. He has managed several wetland permitting projects for maintenance and improvements to interstate natural gas and fiber optic pipelines. Jason is highly proficient in wetland delineation, natural resources assessment, remote sensing, and database compilation and management. He also has experience incorporating the concepts of smart growth and sustainable development in regional planning initiatives and local development projects, particularly in coastal areas and where wetland or aquatic systems are concerned.

Fields of Competence

- Wetland reconnaissance, delineation, and permitting
- Aquatic, estuarine and wetland ecology, including quantitative and qualitative fish community survey methods (EPA rapid bioassessment protocol), Essential Fish Habitat evaluation, aquatic macroinvertebrate ecology, and in-stream macrohabitat assessment
- Terrestrial ecology, including application of Habitat Suitability Indices (HSIs), Forest Stand Delineations, and Riparian Habitat Evaluation
- Aerial photograph, landscape feature, and habitat interpretation
- NEPA consultation

Education

- B.S., Biology, University of Richmond, May 1997

Languages

- Some familiarity with Spanish

Key Projects

Anne Arundel County, MD – Participated in the permitting process for development of a Town Center that involved the greatest amount of regulated wetland impacts associated with a single private development project to date in Maryland. Assisted in a lengthy consultation and application process involving multiple wetland impacts and several applicants. Prioritized potential mitigation sites accounting for topography, hydrology, geology and actual/projected land use. Served as liaison between landowners and county officials during a lengthy mitigation site selection process involving over 250 sites. Prepared several components of the final CWA Section 404 and state application package, including the conceptual mitigation

plan, the description of wetlands at the site, and the evaluation of environmental impacts.

Niagara Falls Airport, NY (Ongoing) – Technical lead on the instream habitat assessment portion of a project to secure permits for the extension of a runway at the airport. Also providing technical assistance on wetland permitting tasks associated with the project, and developing recommendations for the relocation and/or modification of the stream channel to achieve the project purpose and to minimize impacts to the stream.

Confidential Client, MD – Technical lead on wetland reconnaissance and natural resources inventory phase of feasibility study for a potential landfill in Prince George's County, MD. Inventoried wetlands and other natural resources at the site and made recommendations for the future design of the landfill to minimize regulatory liability and maximize useable acreage within the project site.

Lewis and Bezley Real Estate – Managed a study of the feasibility of constructing a waterfront residential community on an approximately 200 acre site in King George County, VA. Mapped and characterized sensitive environmental resources on the site. Evaluated the regulatory liabilities associated with the proposed project, with particular emphasis on federal requirements under the Endangered Species Act, Section 404 of the Clean Water Act, and the National Historic Preservation Act.

University of Maryland – Conducted a wetland delineation and forest stand delineation concurrently at an approximately 20 acre site. Submitted a comprehensive report on wetland and upland vegetation communities at the site and prepared a forest conservation plan in anticipation of a project to re-develop the site for recreational use.

Anne Arundel County, MD – Performed a natural resources assessment on five state-owned parcels in Anne Arundel County, MD, totaling over 580 acres. Verified an existing wetland delineation at the largest of the five parcels (jurisdictional determination pending). Evaluated the vegetative communities, conducted

breeding bird and breeding amphibian surveys, and characterized the aquatic habitats at each site. Ranked the relative value of all terrestrial and aquatic habitat components at each site. Identified environmental constraints on development and mapped significant environmental features and constraints. Provided the County government with a framework based on sustainable development guidelines to inform future land use decisions within the parks.

Maryland Department of Transportation – Performed multiple wetland delineations and natural resources assessments on as-needed basis as part of MDOT's program to inventory natural resources and determine constraints on potential uses of several undeveloped parcels throughout central Maryland. Most recent projects included wetland delineations at three forested parcels in Cape St. Claire, MD, and a wetland delineation in Bowie, MD.

Chesapeake Telecommunication Company, MD – Multiple projects. Managed two projects to secure authorization from the U.S. Army Corps of Engineers and MDE to disturb jurisdictional wetlands as part of two separate pipeline replacement projects in Montgomery County. Also managed a project to survey wetland and riparian areas in need of restoration along a gas pipeline spanning four counties in central Maryland. Coordinated field activities and constructed a database containing information on the condition of 125 sites along the pipeline. Evaluated sites in need of restoration and made specific recommendations to stabilize eroding banks and restore degraded areas.

East Huntington Corporation, MD – Managed a project to evaluate the potential effects of a proposal to expand an industrial park on sensitive aquatic and terrestrial habitats and species, including naturally-reproducing trout in a private pond and the associated tailwater. Assessed the potential for development of the site to impact the safety of municipal drinking water supplies, the effects of increased stormwater runoff on trout populations in adjacent streams, and compatibility of the project with state and local land plans, including the Garrett County General Development Plan and the Maryland Green Infrastructure Program.

Maryland National Capital Parks and Planning Commission, MD – Described in-stream habitat quality, age class and species composition of riparian forest communities and wetlands at 50 sites throughout Montgomery County, MD. Analyzed data collected in field in order to link water quality to the relative integrity of forested riparian buffers.

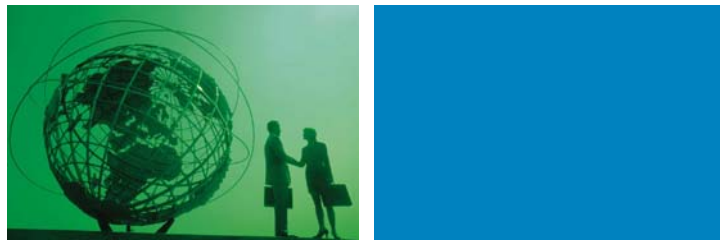
Confidential Client, DE – Conducted a wetland delineation and habitat mapping project on an approximately 175 acre site along the Delaware River in southern New Jersey. Delineated palustrine forested, emergent, and tidal wetlands on site and conducted an inventory of vegetative communities and wildlife habitat at the site. Provided technical assistance during wetland permitting phase of the project.

Texas Instruments, MA – Delineated wetlands and vernal pools at the site and cataloged vegetation. Surveyed and inventoried aquatic macroinvertebrate fauna in vernal pools and wetlands on site and in the portion of a large impounded riverine wetland system immediately offsite. Inventoried herptiles and bird species at the site. Provided expertise in support of a determination of the ecological risk associated with remediation alternatives proposed at the site.

Teknor Corporation, MA – Assessed the ecological condition of a man-made wetland in Attleboro, MA. Described the species composition of the faunal communities in the terrestrial, aquatic, and wetland communities at the site. Surveyed and inventoried aquatic macroinvertebrate and amphibian fauna at the site. Evaluated the relative ecological value of the wetland community at the site to establish baseline conditions prior to commencement of a federally mandated remediation project at the site.

Clean Sites Environmental Services, Inc., MD – Managed field survey project to evaluate water quality and ecological health of wetlands and forested uplands at a Superfund site in Harford County, MD. Conducted surveys for threatened and endangered species. Coordinated permitting for removal of nuisance wildlife from the site.

Ann B. McMenemy, PWS, CWS



For more than 19 years, Ms. McMenemy has been working as a wetland scientist/ecologist permitting an assortment of public and private projects. Her environmental consulting experience consists of field skills in terrestrial and wetland ecology coupled with comprehensive permitting insight gained through collaboration with project team members and regulatory agency staff.

Her technical expertise includes wetland delineation, ecological inventories, wildlife habitat evaluations, wetland functional assessment and mitigation, protected species investigation and mitigation, stormwater management and water quality design, and construction monitoring. She is fluent with the local, state, and federal environmental regulations pertinent to wetlands and rare species in the Northeast, and is adept at sustaining her knowledge with updated or new regulatory provisions.

Ms. McMenemy obtained her professional experience from a diversity of project types including power generation facility siting, utility transmission lines, natural gas pipelines, landfill closure, hazardous materials remediation, highway construction, wastewater disposal, water supply and filtration, commercial, industrial and residential development. She has successfully permitted projects in Massachusetts, Maine, New Hampshire, Connecticut, Rhode Island, and New York.

Registrations & Professional Affiliations

- Society of Wetland Scientists, Certified Professional Wetland Scientist, 1995, #000807
- State of New Hampshire, Certified Wetland Scientist, 1999, #036
- Society of Soil Scientists of Southern New England
- Association of Massachusetts Wetland Scientists
- Society of Wetland Scientists
- New England Botanical Club
- Ipswich, MA Conservation Commission Member

Education

- Graduate level courses in Soil Sciences, University of Massachusetts, 1990-2001
- B.S. Plant and Soil Sciences, University of Massachusetts, 1986

Publications

Sweet, F., et al., "A Tale of Three Brownfields." Proceedings of Hazwaste World Superfund XVII Conference, October 1996.

Hollands, G., F. Sweet, et al., "Interdisciplinary Permitting to Close and Develop an Industrial/Municipal Landfill with Associated Wetlands Replacement." Proceedings of the New England Environmental Expo, May 1996.

Hollands, G., S. Lamoureux, A. McMenemy, F. Sweet, and M. Worthington, 1996. Interdisciplinary permitting to close and develop an industrial/municipal landfill with associated wetlands replacement. Proceedings of Polluted and Marginal Land-96 Conference, Brunel University, Uxbridge, West London, UK.

Key Projects

The Shoppes at Blackstone Valley, Millbury, Massachusetts. Wetland Scientist for the proposed 750,000 square foot retail shopping center on a 131-acre site. The 7-year involvement with this project consisted of wetland delineation, state and federal wetland permitting including alternatives analysis and mitigation, and MEPA documents for the retail development, off-site traffic mitigation, and utilities. In addition to permitting services, provided construction and wetland restoration monitoring, and regulatory assistance for a DEP enforcement action during the construction phase.

Lowe's Corporation Due Diligence for Retail Development, Framingham, Massachusetts. Assisted in real estate transaction by completing field work, regulatory file review, and background research to advise a developer of regulatory implications for redevelopment of a corporate office building to a home improvement store relative to wetlands and protected species.

LKQ Used Auto Parts, Webster, Massachusetts. Assisted auto salvage business owner with DEP enforcement actions including assessment of impacts, negotiation of settlement, drafting of Supplemental Environmental Project, design of wetland restoration and stormwater management system, and construction oversight. Metals Recycling, Worcester, Massachusetts. Performed a regulatory and field review to advise an industrial client regarding the local and state wetland permit conditions governing a partially constructed project and in order to evaluate actions for compliance.

Target Stores, Waterford, Connecticut. Project Manager who implemented the local wetland permit condition for a 2-yr post-construction water quality monitoring program to evaluate the effect of the development, and stormwater management system on Jordan Brook. Compiled a database of water monitoring data of healthy streams similar to Jordan Brook to create an 80th percentile reference database. Provided interpretation of the water chemistry to the town, and worked with Target Corporation to address elevated constituents.

Negotiated with Waterford Planning Commission to conclude sampling program based on adequate water quality data documenting the functioning of stormwater management system.

NSTAR, Sutton, Southborough, Hopkinton, Kingston, Holden, Massachusetts. Provide senior wetland scientist oversight of wetland and rare species permitting for installation or repair of electric transmission lines. Service as technical and regulatory resource for client regarding permitting and enforcement issues.

Vitale Fly Ash Consolidation and Habitat Restoration Project, Beverly/Wenham, Massachusetts. Project purpose is to restore wooded wetlands and a stream corridor impacted by eroded fly ash that was deposited in uplands tributary to a public water supply reservoir. Provided technical oversight of the design of wetland and wildlife habitat restoration areas including planting, soils, and erosion control specifications for construction. Teamed with engineers to balance goals of elimination or containment of fly ash with re-establishment of diverse native vegetative cover, wetland hydrology, and wildlife habitat features. Restoration challenges included complex hydrology integral to the water supply management goals of the reservoir, existing populations of invasive plant species, and intricate construction sequencing.

Northwoods Crossing, Taunton, Massachusetts. Project manager responsible for state permitting for retail shopping center including preparation of MEPA and Wetlands Protection Act filings. The project was complicated by the presence of mapped spotted turtle habitat and a potential vernal pool on the site, and the site's location within an Area of Critical Environmental Concern. Conducted a survey of potential turtle nesting sites, coordinated with the Natural Heritage and Endangered Species Program and project engineers to prepare a Conservation Plan to protect the rare species habitat. Performed and supervised construction monitoring to implement the Conservation Plan.

Philip M. London



Mr. London is a Project Manager with over 14 years of wetland permitting and environmental assessment experience, with a special emphasis on natural gas pipelines, overhead electric transmission power lines, and other linear facilities. Mr. London has conducted wetland delineations, habitat evaluations for protected species, and construction-related impact assessments for approximately 500 miles of linear corridor. For natural gas pipeline projects, Mr. London has managed three environmental report submissions to the Federal Energy Regulatory Commission (FERC), as part of the Application for a Certificate of Public Convenience and Necessity, as well as provided field, FERC resource report, and Federal and state environmental permitting support to about 40 new pipeline or maintenance projects in the eastern United States. In addition to linear projects, Mr. London routinely conducts wetland delineations, federal and state wetland permitting, EIS preparation (i.e., MEPA), and agency consultations for commercial land development projects in southern New England.

Mr. London is recognized as a Soil Scientist through the Society of Soil Scientists of Southern New England (SSSSNE). His focus is in using soil morphology to re-construct wetland boundaries that have either been filled or disturbed, plus other applications such as soil mapping, interpreting the mean annual high water elevation from soil profiles for stormwater management basin design, and peer-review. These evaluations/findings have been reviewed and accepted in the past by the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), and local conservation boards.

Registrations & Professional Affiliations

- Society of Soil Scientists of Southern New England
- OSHA 40-Hour HAZWOPER Certification

Fields of Competence

- Environmental Impact Report Preparation (i.e., NEPA, MEPA, SEQRA)
- Federal and State Wetland Permitting
- Wetland Delineation, Functional Assessment, and Mitigation Design
- Soil Investigations, Documentation, and Mapping
- Environmental Inspection

Education

- MS (in progress). Environmental Management and Energy Policy, University of Maryland University College, Maryland, 2007
- BS. Soil and Water Science, University of Rhode Island, Rhode Island, 1992

Key Projects

Linear Facility Projects – Wetland Delineation and Environmental Permitting

Iroquois Gas Transmission System; Brookhaven Lateral Project, Long Island, NY. Project Manager for an approximately 22-mile long natural gas transmission pipeline in Smithtown, Islip, and Brookhaven, New York. Responsible for managing over 45 miles of biological field surveys, the preparation of FERC Resource Reports and survey reports, responses to FERC data requests, the development of unanticipated contamination contingency plans, and agency consultations. Draft resource reports were submitted to the FERC in November 2005.

Iroquois Gas Transmission System; Market Access Project, Connecticut and New York. This project involved the construction of a new natural gas compressor station with coolers in Brookfield, CT and the installation of new gas coolers at an existing compressor station in Dover, NY. Managed all field surveys and agency consultations, wrote all FERC Resource Reports (excluding Air/Noise and Cultural Resources); and participated in public open houses and presentations. Draft resource reports were submitted to the FERC in January 2006; the final ER was submitted in March 2006.

Iroquois Gas Transmission System; Eastchester Extension Project, New York. Senior environmental scientist on a project to construct approximately 36.4 miles of new 24-inch OD natural gas pipeline from Northport, NY to New York City via Long Island Sound. This project also involved the construct of two new compressor stations and expansions to three existing stations in upstate NY. For the NEPA process, wrote the FERC Resource Reports covering Long Island Sound, onshore waters, wetlands, wildlife, vegetation, geology, soils, and land use; and responded to related FERC data requests. Also, prepared the project's Joint Application for Permit (USACE and state wetland permits) and managed the consultation process with the USFWS and the NSYDEC. The pipeline was placed into service in February 2004.

Algonquin Gas Transmission Company; Annual Integrity Programs, Massachusetts, Connecticut, and Rhode Island. Project Manager for Algonquin's annual maintenance projects involving aboveground facility modifications, cathodic protection ground beds, dig-outs, coating repairs, and pipe replacements in wetlands, rivers and ponds. As project manager, provided regulatory guidance, secured federal and state environmental permits, resolved threatened and endangered species issues, consulted with regulatory agencies, and presented projects at local hearings. Accomplishments included securing USACE and state permits to install a 3,000-foot long ground bed in the Hudson River near Stony Point, NY.

Algonquin Gas Transmission Company; Tiverton Power Associates, Massachusetts and Rhode Island. This project involved two miles of pipeline replacement, a new 500-foot long lateral, and 20 miles of in-line inspection. Delineated all wetlands in the project corridor and prepared the following environmental permit applications/reports: FERC Resource Reports, Section 401/404 applications, MA Notices of Intents, and the project's Stormwater Pollution Prevention Plan. Also, prepared the Expanded Environmental Notification Form that successfully received a waiver from the MEPA requirements of filing a Draft EIR.

Major Northeast U.S. Electric Utility; Electric Transmission Line Maintenance/Structure Replacement and Equipment Upgrade Project. Environmental scientist responsible for surveying the existing 12-mile long powerline right-of-way for wetlands, watercourses, and potential threatened and endangered species habitat; and also identifying equipment access options to approximately 220 pole structures based on soil and site constraints. As part of the permitting effort, prepared several Notices of Intent and Requests for Determination of Applicability pursuant to the Massachusetts Wetlands Protection Act regulations.

Connectiv Power Delivery, Cardiff to Sands Point Powerline, New Jersey. Environmental scientist on a project to upgrade 53 miles of 69kV transmission line to 230kV through reconductoring and tower upgrades, which extended into new right-of-way. Surveyed approximately 26 miles of the project corridor for wetlands and watercourses in accordance with federal and state regulations, including the 1991 *New Jersey Pinelands Commission Manual for Identifying and Delineating Pinelands Area Wetlands*.

Level 3 Communications, Fiber Optic Cable Project, Massachusetts and New York. Led the wetland delineation along the entire 170-mile preferred route from Albany, NY to Boston, MA and several route alternatives. For the permitting effort, prepared the Full Environmental Assessment Form (SEQRA process), Joint Application for Permit, and the Stormwater Pollution Prevention Plan for the NY section; and 14 Requests for Determination of Applicability for the MA section. Also, presented the project at several local conservation commission hearings in MA.

Massachusetts Highway Department; I-93/95 (Route 128) Transportation Improvement Project, Massachusetts. Project involved adding a northbound and southbound travel lane and shoulder along an approximately 24-mile segment of the Route 128 corridor. Prepared the Notice of Intent document for Phase I of this project in Canton, Dedham, Milton, Randolph and Westwood, which included proposed culvert extensions at the Blue Hills River, wetland mitigation areas, and compensatory flood storage areas. Also, prepared the project's Chapter 91 License Application for the replacement of a three-span bridge over the Neponset River in Dedham and Canton.

Land Development – Wetland Delineation and Environmental Permitting

Hebrew Rehabilitation Center for Aged, New Site Development, Dedham, Massachusetts. This project involved the proposed construction of a senior housing community, school, and recreational fields on an 164-acre site bordering the Charles River. Delineated and documented all federal and state wetland resource

areas, including the mean annual high water line along approximately 4,500 feet of the Charles River to establish the on-site limit of Riverfront Area and two vernal pool habitats. Wrote the existing wetland conditions and regulatory compliance sections in the Notice of Intent and MEPA documents (DEIR and FEIR).

Erickson Retirement Communities, Linden Ponds at Hingham, Hingham, Massachusetts. Prepared the project's Category II – MA Programmatic General Permit application and the Wetland Mitigation Plan per the USACE checklist requirements for this new continuing care community on a 108-acre site. The mitigation plan detailed the construction of three separate wetland mitigation areas totaling approximately one acre and the enhancement of two acres of wetland habitat through the elimination of *Phragmites australis*. Also, prepared the project's water quality certification application (Major Project Certification - BRP WW 10).

Reebok International Ltd.; New World Headquarters, Canton, Massachusetts. Conducted wetland delineation and habitat assessment at the 150-acre site and at all off-site traffic mitigation areas. Also, wrote the sections on surface waters, wetlands, wildlife, and floodplains for the project's DEIR pursuant to MEPA.

Soil Investigations

TPA Associates; New Site Development, Oxford, Connecticut. Documented 32 test pits in compact glacial till to identify dominant textures, confining layers, and depth to mean high water tables. This information was used to design the site's stormwater detention basins.

Private Developer; Wetland Violations, Norton, Massachusetts. Soil Scientist in an investigation of filled wetlands at a 300-acre industrial park site. Tasks included making hydric soil determinations at over 125 test pit locations, reconstructing wetland boundaries, and documenting soil profiles. In total, identified and delineated approximately 10 acres of filled wetlands, with the delineation reviewed and approved by the USACE.

Qualifications Summary

- Twelve years consulting experience with industry, government, and private research organizations
- Experience with Natural Resource Damage Assessment, Habitat Equivalency Analysis, Ecological Risk Assessment, State and Federal permitting processes, and ecosystem restoration.
- Recent restoration projects include coastal dunes, vernal pools, and seagrass beds
- Consulting projects include assessment of marine and coastal damage from the 1991 Gulf War, fishery habitat assessments for Environmental Impact Statements, and a bio-economic study of water quality in a coastal inlet on Long Island
- Ongoing research includes development of a bio-economic model of shellfish aquaculture. This is a multi-investigator project with scientists at the Woods Hole Oceanographic Institution, Marine Policy Center.

Heidi J. Clark, Ph.D.

Coastal Scientist

Fields of Expertise

Research, technical writing, and project management for various coastal and marine environmental projects. Experience in environmental impact assessment, natural resource damage assessment, habitat equivalency analysis, and ecological risk estimation. Research and technical training in ecology, ecosystem management, shellfish and finfish aquaculture. Current research on the biology and economics of shellfish aquaculture in eutrophic coastal waters.

Higher Education

Ph.D. Environmental Studies, Yale University (2000)
M.F.S. Forest Science, Yale University (1997)
M.S. Exercise Science, University of Massachusetts (1991)
B.A. Biology, University of California, Santa Cruz (1987)

Employment History

2003-Present Coastal Scientist, Woods Hole Group, Inc.
2001-Present Guest Scientist, Woods Hole Oceanographic Institution.
1995-2001 Self Employed Environmental Consultant.
1996-1997 Aquaculture Technician, Marine Biological Lab
1992-1997 Guest Student, Woods Hole Oceanographic Institution.

Key Projects

Gateway Energy Bridge (LNG) Deepwater Port EIS/EIR – Marine Resource Assessment

Preparation of EIS/EIR sections on fish, benthic communities, and other marine resources. Ongoing work includes assessment of pre-project conditions, potential impacts, time of year restrictions, endangered species, and essential fish habitat assessment.

Quashnet River Habitat Assessment – Field Work and Technical Writing

Assessment of fish habitat, river and wetland conditions, and options for restoration of sections of the. Ongoing work includes field work, historical research, and coordination with Town and Regional planners.

Sconset Beach Nourishment Project EIR - Project Manager

Preparation of EIR sections on fishery, benthic, and other marine resources. Work included development of a comprehensive monitoring plan for assessment of pre-project conditions, potential impacts, appropriate time of year restrictions, mitigation options, and essential fish habitat assessment.

Kuwait HEA – Project Manager

Habitat Equivalency Analysis (HEA) of damages to coastal and marine resources resulting from the 1991 Iraqi invasion. Work included assessment of ecosystem services lost due to oil damage, estimates of recovery time, and development of appropriate restoration projects. Results presented to the United Nations Compensation Commission (UNCC) in Geneva.

Centerville River Environmental Impact Assessment

Fieldwork and reporting on potential impacts on fish and wildlife that might result from a proposed dredging project. Work included an essential fish habitat assessment as well as assessment of impacts on non-EFH species.

Cranberry Farming Debate – Lead Technical Writer

Research and writing on pros and cons of cranberry farming on the Coonamessett River in Falmouth, MA.

Publications and Presentations

“Bio-economic Model of Shellfish Aquaculture: Using Aquaculture as Part of a Comprehensive Nitrogen Management System for Coastal Watersheds on Cape Cod”. Report to NOAA/CICEET. Report in progress.

“Economic Value of Natural Resource Services Potentially Impacted by a Change in Cooling Water Regime at the Haynes and AES Alamitos Generating Stations”. Prepared for Los Angeles Department of Water and Power. May 2005.

Publications and Presentations (continued)

- “Fish and Benthic Resource Habitat Assessment for Centerville River”. Report to Town of Barnstable, MA. October 2004.
- “Environmental Effects of Dredging in Coastal Embayments” Report to Town of Barnstable, MA. October 2004.
- “Monitoring and Assessment of the Environmental Consequences of the Iraqi Aggression in Kuwait: Damage Assessment Report. Prepared for Safège, Nanterre, France. May 2004.
- Clark, H. and J. Kremer. 2004. "Estimating direct and episodic atmospheric deposition to a coastal waterbody". *Marine Environmental Research*. June.
- Clark, H., W. Clark, D. Murphy, W. Burt, and D. Leavitt. 2002. “A review of seagrass restoration programs and technologies with reference to application on Cape Cod”. *Environment Cape Cod* October.
- Clark, H. 2002. “Seagrass Restoration on Cape Cod: Review of Appropriate Methods and an Eelgrass Planting Trial for Eastham Harbor”. Summer 2002.
- Clark, H. 2000. “Ecological Risks Associated with Nutrient Loading in Coastal Waters: Reducing the Risks by Restoring Shellfish”. Ph.D. Dissertation, Yale University.
- Clark, H. 1999. "Fate and ecological effects of nitrogen in coastal waters" in Industrial Economics, Inc. "Benefits Assessment of Decreased Nitrogen Deposition to Estuaries in the United States Attributable to the Clean Air Act Amendments, 1990-2010". Work Assignment 4-11, Task 7 for the US Environmental Protection Agency, Section 812 - Prospective Ecological Benefits Assessment of the CAAA.
- K.A. Vogt, J. Gordon, J. Wargo, H. Clark and collaborators. 1997. Ecosystems: Balancing Science and Management Springer, New York.
- K. Johnson, K.A. Vogt, H.J. Clark, O.J. Schmitz, D.J. Vogt. 1996. “Biodiversity, and the Productivity and Stability of Ecosystems” *Trends in Ecology and Evolution* 11(9):372-377.
- H. Clark and G. Wikfors. 1996. “Oysters as processors of particulate organic nitrogen: quantitative and qualitative relationships between inputs and outputs” *Journal of Shellfish Research* 115(2):457.

Qualifications Summary

- Over 20 years experience in geologic and coastal process evaluation.
- Specializes in analysis of shoreline change using traditional aerial photos, historical maps and charts, and high-resolution digital photography.
- Skilled at utilizing GIS technology to display and analyze spatially related data for coastal and marine projects.
- Extensive experience with local, state, and federal permitting of coastal projects.
- Strong written, communication, and organizational skills.

M. LESLIE FIELDS, M.S., B.S.

Coastal Geologist

Professional Affiliations

Marine Outreach Guidance Group, Woods Hole Oceanographic Institution Sea Grant Program (1999-2004)

Member Falmouth Conservation Commission (1990-1997)

Fields of Expertise

Shoreline change analyses, coastal hazard evaluation, GIS development, environmental impact analyses, coastal wetland delineation, sediment transport analyses, tidal inlet hydrodynamics, nearshore wave propagation analyses, storm surge analyses, and permitting (local, state, and federal).

Higher Education

M.S., Geology-Rutgers University (1984)

B.S., Geology-Southern Methodist University (1981)

Employment History

1989-Present Woods Hole Group, Inc.

2003-2004 Massachusetts Coastal Zone Management

1984-1989 U.S. Army Corps of Engineers

1981-1984 Rutgers University

1980-1981 Sun Energy and Development Co.

Key Projects

Design, Environmental Impact Analysis and Permitting for Chapoquoit Beach Replenishment, West Falmouth, MA; Chapoquoit Associates; Project Manager/Coastal Geologist.

Managed a large private/public partnership project to replenish eroding beaches along the Chapoquoit Beach section of West Falmouth, MA using sand dredged from the Cape Cod Canal by the US Army Corps of Engineers. The project involved detailed design computations for the replenishment, as well as wave and sediment transport modeling to evaluate spreading and potential impacts of the project. Extensive project management was required to facilitate permitting on a fast track basis and to coordinate construction with the USACE's schedule.

Key Projects (continued)

Design, Environmental Impact Analysis and Permitting for the Centerville River Dredging Project, Centerville, MA; Town of Barnstable, Project Manager/Coastal Geologist.

Managed a large-scale municipal project to dredge the Centerville River for the purposes of improving navigation. This project involved extensive field investigations of the physical environment, biology, wetland resources, and sediments within the river. The nature of the sediments required identification of two types of reuse sites for the dredged material. The design included beach replenishment at the adjacent barrier beach for the sand sized material, and a variety of upland reuse sites for the fine-grained sediments. The project required the full range of environmental permits from local, state, and federal agencies.

Federal Emergency Management Agency (FEMA) Flood Insurance Restudy for the Town of Hampton, NH; FEMA, Project Manager/Coastal Geologist.

Performed and managed a Flood Insurance Restudy (FIS) for the Town of Hampton, NH. This project involved updating the FEMA Flood Insurance Rate Maps (FIRM) for the Town of Hampton by re-establishing the flood zone boundaries. Numerical models were utilized to simulate nearshore wave transformation and wave runup, and were combined with estimates of erosion to determine the location of the flood zones. The FIRMs were updated using quantitative information on waves, wave runup, and flooding, and were graphically displayed within a GIS.

Environmental Impact Statement (EIS) Preparation for LNG Deepwater Port and Pipeline, Massachusetts Bay; US Coast Guard, Marine Mammal Specialist.

Developed detailed information on existing uses of Massachusetts Bay by marine mammals and sea turtles as required for the proposed LNG project. The analysis covered all aspects of marine mammal behavior, including seasonal distribution, feeding and foraging, vocalization, population, mating, and threats. A thorough impact analysis on marine mammals and sea turtles from the proposed construction and operation of the project was also conducted. A wide range of impacts was considered including the following: physical harassment, vessel strikes, alteration to habitat, acoustic harassment, alteration of prey species abundance and distribution, entanglement, ingestion of marine debris, fuel spills, impingement and entrainment, and bioaccumulation. Recommendations for minimization and/or mitigation of impacts were included as part of the EIS document.

Historical Shoreline Change Analysis: Western Town Line to Horton Point, Southold, NY; Town of Southold, Project Manager/Coastal Geologist.

Managed and performed a comprehensive historical analysis of a 10-mile segment of shoreline within the western portion of the Town of Southold. The analysis was performed using historical T-sheets, traditional aerial photography, and low-altitude, high-resolution digital photography. Rates of shoreline change were computed at 100-ft intervals throughout the study area. The impacts of shoreline protection structures and storms on the historical rates of shoreline change were evaluated. Estimates of longshore transport rates were obtained from the shoreline data.

Assessment of Sand Resources in Northern and Central San Francisco Bay, CA; Hanson Aggregates, GIS Analyst.

Worked with a team of WHG professionals to assess sand resources in Northern and Central San Francisco Bay, and to evaluate Hanson Aggregate and RMC leased sand borrow regions to

determine their viability as a renewable sand resource. The work was accomplished using available hydrodynamic, geophysical, sediment, and geological data as well as digital terrain modeling tools available with the GIS software ArcInfo. Historical changes in bottom topography were evaluated using an acoustic survey of the bedrock surface, coupled with NOS bathymetric surveys and a high-resolution multibeam survey collected by the USGS. Isopach maps showing changes in sediment thickness were generated and used to compute variations in sediment volume within specified borrow sites.

Publications and Presentations

Journal Publications **11**

Technical Reports **32**



Mr. Willey has approximately seven years' experience in ecology and natural resource management with specific expertise in wetland, aquatic and estuarine ecology, and has evaluated freshwater, estuarine and wetland biological communities in several states on the Atlantic, Pacific and Gulf Coasts. He has managed several wetland permitting projects for maintenance and improvements to interstate natural gas and fiber optic pipelines. Jason is highly proficient in wetland delineation, natural resources assessment, remote sensing, and database compilation and management. He also has experience incorporating the concepts of smart growth and sustainable development in regional planning initiatives and local development projects, particularly in coastal areas and where wetland or aquatic systems are concerned.

Fields of Competence

- Wetland reconnaissance, delineation, and permitting
- Aquatic, estuarine and wetland ecology, including quantitative and qualitative fish community survey methods (EPA rapid bioassessment protocol), Essential Fish Habitat evaluation, aquatic macroinvertebrate ecology, and in-stream macrohabitat assessment
- Terrestrial ecology, including application of Habitat Suitability Indices (HSIs), Forest Stand Delineations, and Riparian Habitat Evaluation
- Aerial photograph, landscape feature, and habitat interpretation
- NEPA consultation

Education

- B.S., Biology, University of Richmond, May 1997

Languages

- Some familiarity with Spanish

Key Projects

Anne Arundel County, MD – Participated in the permitting process for development of a Town Center that involved the greatest amount of regulated wetland impacts associated with a single private development project to date in Maryland. Assisted in a lengthy consultation and application process involving multiple wetland impacts and several applicants. Prioritized potential mitigation sites accounting for topography, hydrology, geology and actual/projected land use. Served as liaison between landowners and county officials during a lengthy mitigation site selection process involving over 250 sites. Prepared several components of the final CWA Section 404 and state application package, including the conceptual mitigation

plan, the description of wetlands at the site, and the evaluation of environmental impacts.

Niagara Falls Airport, NY (Ongoing) – Technical lead on the instream habitat assessment portion of a project to secure permits for the extension of a runway at the airport. Also providing technical assistance on wetland permitting tasks associated with the project, and developing recommendations for the relocation and/or modification of the stream channel to achieve the project purpose and to minimize impacts to the stream.

Confidential Client, MD – Technical lead on wetland reconnaissance and natural resources inventory phase of feasibility study for a potential landfill in Prince George's County, MD. Inventoried wetlands and other natural resources at the site and made recommendations for the future design of the landfill to minimize regulatory liability and maximize useable acreage within the project site.

Lewis and Bezley Real Estate – Managed a study of the feasibility of constructing a waterfront residential community on an approximately 200 acre site in King George County, VA. Mapped and characterized sensitive environmental resources on the site. Evaluated the regulatory liabilities associated with the proposed project, with particular emphasis on federal requirements under the Endangered Species Act, Section 404 of the Clean Water Act, and the National Historic Preservation Act.

University of Maryland – Conducted a wetland delineation and forest stand delineation concurrently at an approximately 20 acre site. Submitted a comprehensive report on wetland and upland vegetation communities at the site and prepared a forest conservation plan in anticipation of a project to re-develop the site for recreational use.

Anne Arundel County, MD – Performed a natural resources assessment on five state-owned parcels in Anne Arundel County, MD, totaling over 580 acres. Verified an existing wetland delineation at the largest of the five parcels (jurisdictional determination pending). Evaluated the vegetative communities, conducted

breeding bird and breeding amphibian surveys, and characterized the aquatic habitats at each site. Ranked the relative value of all terrestrial and aquatic habitat components at each site. Identified environmental constraints on development and mapped significant environmental features and constraints. Provided the County government with a framework based on sustainable development guidelines to inform future land use decisions within the parks.

Maryland Department of Transportation – Performed multiple wetland delineations and natural resources assessments on as-needed basis as part of MDOT's program to inventory natural resources and determine constraints on potential uses of several undeveloped parcels throughout central Maryland. Most recent projects included wetland delineations at three forested parcels in Cape St. Claire, MD, and a wetland delineation in Bowie, MD.

Chesapeake Telecommunication Company, MD – Multiple projects. Managed two projects to secure authorization from the U.S. Army Corps of Engineers and MDE to disturb jurisdictional wetlands as part of two separate pipeline replacement projects in Montgomery County. Also managed a project to survey wetland and riparian areas in need of restoration along a gas pipeline spanning four counties in central Maryland. Coordinated field activities and constructed a database containing information on the condition of 125 sites along the pipeline. Evaluated sites in need of restoration and made specific recommendations to stabilize eroding banks and restore degraded areas.

East Huntington Corporation, MD – Managed a project to evaluate the potential effects of a proposal to expand an industrial park on sensitive aquatic and terrestrial habitats and species, including naturally-reproducing trout in a private pond and the associated tailwater. Assessed the potential for development of the site to impact the safety of municipal drinking water supplies, the effects of increased stormwater runoff on trout populations in adjacent streams, and compatibility of the project with state and local land plans, including the Garrett County General Development Plan and the Maryland Green Infrastructure Program.

Maryland National Capital Parks and Planning Commission, MD – Described in-stream habitat quality, age class and species composition of riparian forest communities and wetlands at 50 sites throughout Montgomery County, MD. Analyzed data collected in field in order to link water quality to the relative integrity of forested riparian buffers.

Confidential Client, DE – Conducted a wetland delineation and habitat mapping project on an approximately 175 acre site along the Delaware River in southern New Jersey. Delineated palustrine forested, emergent, and tidal wetlands on site and conducted an inventory of vegetative communities and wildlife habitat at the site. Provided technical assistance during wetland permitting phase of the project.

Texas Instruments, MA – Delineated wetlands and vernal pools at the site and cataloged vegetation. Surveyed and inventoried aquatic macroinvertebrate fauna in vernal pools and wetlands on site and in the portion of a large impounded riverine wetland system immediately offsite. Inventoried herptiles and bird species at the site. Provided expertise in support of a determination of the ecological risk associated with remediation alternatives proposed at the site.

Teknor Corporation, MA – Assessed the ecological condition of a man-made wetland in Attleboro, MA. Described the species composition of the faunal communities in the terrestrial, aquatic, and wetland communities at the site. Surveyed and inventoried aquatic macroinvertebrate and amphibian fauna at the site. Evaluated the relative ecological value of the wetland community at the site to establish baseline conditions prior to commencement of a federally mandated remediation project at the site.

Clean Sites Environmental Services, Inc., MD – Managed field survey project to evaluate water quality and ecological health of wetlands and forested uplands at a Superfund site in Harford County, MD. Conducted surveys for threatened and endangered species. Coordinated permitting for removal of nuisance wildlife from the site.

Charles J. Katuska, PWS



Mr. Katuska has 24 years of multidisciplinary experience in the development, management, and technical performance of environmental consulting projects. With significant project experience in wetland and wildlife ecology, as well as various environmental investigations and regulatory practice at scores of existing facilities and new developments across New England, he provides broad-based support to ERM's environmental restoration teams. His experience includes various baseline ecological investigations, project development planning, design efforts, permitting, construction period responsibilities, and design and implementation of post-construction monitoring programs at more than 40 environmental restoration project sites.

Given the partnership structure of many significant environmental restoration projects, Mr. Katuska has served as project manager, coordinator, technical services provider, and/or regulatory specialist in projects led or sponsored by the U.S. Army Corps of Engineers (USACE)-New England Division, National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency (Region 1), U.S. Department of Agriculture (USDA) Natural Resources Conservation Service, and Massachusetts Wetlands Restoration Program.

Registrations & Professional Affiliations

- Professional Wetland Scientist (No. 696)
- Society of Wetland Scientists, member (1984-Present)
- Southborough Conservation Commission, member (1995-2004)
- Carver Conservation Commission, member (1988-1991), chairman (1991-1993)
- Association of Massachusetts Wetland Scientists, member (1991- Present)
- Massachusetts Association of Conservation Commissions, speaker (1993, 1994, 1997-2006 Annual Meetings), instructor (Professional Conservation Commissioner Training, 1997-Present), Director (1998-2007)

Fields of Competence

- Wetland Ecology - identification, delineation, functional assessment, mitigation/restoration planning, design, and construction
- Wildlife Ecology - general habitat assessment, species-specific sampling & population surveys, aquatic macroinvertebrates, herpetology
- Environmental Impact Assessment & Environmental Restoration - planning, design, permitting, construction & monitoring

Education

- M.F.S.; Yale School of Forestry and Environmental Studies; Wildlife Ecology; 1983
- B.S.; Yale University; Biology; 1978

Languages

- English, native speaker

Publications

C. Foote-Smith & C. Katuska, 2000. A Citizens Guide to Wetland Restoration in Massachusetts. MA Executive Office of Environmental Affairs.

C. Foote-Smith & C. Katuska, 1998. The Neponset River Watershed Wetlands Restoration Plan. MA Wetlands Restoration & Banking Program.

C. Katuska, 1990. Wildlife Habitat Considerations in Land Development. Massachusetts Lawyers Weekly.

C. Katuska, 1989. Wildlife Habitat Considerations in Land Development. New England Real Estate Journal.

J. Anderson, C. Katuska, B. Marks, 1984. In Absentia: The Historical Ranges of Select Rare and Endangered Species of Connecticut. The Nature Conservancy, CT Chapter.

C. Katuska, 1983. The International Trade in Living Reptiles. Bulletin of the Connecticut Herpetological Society.

C. Katuska, 1983. Ecological Inventory and Management Plan for Chapman's Pond Preserve, East Haddam, CT. The Nature Conservancy, CT Chapter.

C. Katuska, 1982. Husbandry and Management of the Genus Python. Bulletin of the Connecticut Herpetological Society.

Key Projects

Acushnet River (Massachusetts) Fish Passage Restoration Project; National Oceanographic and Atmospheric Administration; July 2004 – May 2006 – Project Manager for the execution of task order under nationwide NOAA contract for environmental restoration projects to develop preliminary and final engineering designs, plans, specifications, project permitting, and bid packages for fish passage improvements at two low-head dams along the Acushnet River in New Bedford, Massachusetts. Additional services include design of a 5-year

monitoring plan and the preparation, processing, and coordination necessary to secure all local, state, and federal wetland, waterway, and dam safety permits required.

Nonquitt Salt Marsh Restoration Project (Massachusetts); NOAA; December 2004 – May 2006 – Project Manager for the preparation of preliminary design and final engineering plans, construction specifications, and bid packages for improvements to tidal flushing at a private roadway crossing in order to support restoration on 90 Acres of impacted salt marsh. Additional services include management of subcontracted geotechnical and coastal process support services, preparation of operation and maintenance plans, and the preparation, processing, and coordination necessary to secure all state and federal wetland, waterway, and coastal zone management permits required.

Mussachuck Creek (Rhode Island) Salt Marsh Restoration Project; USDA Natural Resources Conservation Service; July 2004 – May 2006 – Senior Technical Reviewer for the preparation of preliminary and final engineering designs, plans, specifications, and bid packages for improvements to tidal flushing at a constricted ocean inlet, culverted public roadway crossing, and 2 low chord cart/pedestrian bridges. Additional services include design of flood mitigation improvements to an existing private golf course; and the preparation, processing, and coordination necessary to secure all local, state, and federal wetland, waterway, and coastal zone management permits required.

Commercial Site Redevelopment Project; Coffman Realty; May 2006 – November 2006 – Project Manager for the preparation of Draft/Final Environmental Impacts Reports (EIRs) for a mixed-use site redevelopment project in Wilmington, Massachusetts (EOEA No. 13731). Tasks includes management of EIR-related work products from client subcontractors (civil engineering, architect, landscape architect, traffic engineer, environmental engineer), editorial responsibility for subcontractor EIR products, preparation of all environmental EIR chapters, production responsibility for DEIR/FEIR documents,

and post-submission coordination of agency responses. Project received EOEAs Secretary's Certificate on the Final EIR ("adequately and properly complies...") on November 16, 2006.

Parkway Plaza Redevelopment; Pennoni Engineering Associates, Inc; April-December 2004—Subcontracted to an environmental engineering firm in order to provide specialized technical services and regulatory support for the licensing of a commercial redevelopment program pursuant to the Massachusetts Public Waterfront Act (M.G.L.CH.91). Specific services include geotechnical investigations and historic map research as necessary to identify the historic limits of jurisdiction; tidelands impact mitigation planning; and the preparation of all plans, documents, and narratives necessary to support licensing application.

Coonamessett River Natural Resources Inventory; Massachusetts Wetlands Restoration Program; April-June 2004—Conducted field surveys, literature reviews, and interviews as necessary to document the historic and current distribution of plant and vertebrate animal species within the Coonamessett River watershed, Falmouth, Massachusetts. Assessed and mapped substrate characteristics and river bank morphology with respect to in-stream fish habitat requirements and anadromous fish passage. Chronicled the history of agriculture within the watershed, especially as directly affecting the river system (cranberry beds), and documented the 300-year history of conflict between industrial or agricultural production and fisheries within the watershed. This state-funded assessment was prepared on behalf of a municipal study group charged with evaluating restoration options for 100+ acres of town-owned land along the main stem of the river.

Lakeville Commons; Lakeville Conservation Commission; 2003—Developed and implemented a field program of investigations to collect baseline data in a 40-acre Atlantic white cedar (*Chamaecyparis thyoides*) wetland downgradient of a proposed residential subdivision. Field investigations included vegetation survey and mapping, dendrochronology (recent growth and vigor), water quality sampling, algal collections, and the establishment of a series of permanent monitoring plots. Conclusions derived from the field study report were used by the local regulatory authority to condition the proposed development.

Vitale Ecological Restoration Project; National Grid; 2001-2002—Coordinated restoration aspects of integrated program of

landfill capping, environmental restoration design, and dredging services for the removal of 80,000 yd³ of fly ash from a 15-acre wetland corridor between a historic landfill and Wenham Lake, a public water supply reservoir. Specific services included assessment of existing vegetation and wildlife habitat; preparation of initial grading and drainage, planting, construction sequencing, and erosion control plans; development of contract-growing specifications for required plant materials; plant material holding and handling specifications; and preparation of permit package and field inspections, coordination, and public representation as necessary to secure project approvals under the Massachusetts Wetlands Protection Act.

Neponset River Salt Marsh Restoration Project, Phase 1B; Coastal America Foundation; 2001-2002—Managed a program of field surveys, biological assessments, hydraulic engineering services, and regulatory support services necessary to design and permit modifications to an existing culvert restricting the flow of saltwater to approximately 12 acres of degraded salt marsh within the Neponset Salt Marshes in Boston, Massachusetts. The Neponset River Salt Marsh Restoration Project, Phase 1B, is part of a larger marsh restoration effort initially developed by the Massachusetts Wetlands Restoration Program and now being undertaken, at least in part, by the Metropolitan District Commission and project partners. The Phase 1B project included close coordination between the USDA Natural Resources Conservation Service (project partner), Metropolitan Water Resources Authority (drinking water supplier), and Metropolitan District Commission (landowner), and the preparation and processing of permit applications required under local, state, and federal wetlands protection statutes. Prompt, cost-effective performance on this contract led to a timely modification of existing plans for salt marsh restoration without additional risk to a nearby 48-in. diameter public water supply main.

Ramapo Electric Generation Project; Ramapo Energy Partnership, Ltd.; 2001-2002—Managed wetland delineation and assessment services, wetland impact assessment and mitigation planning, development or mitigation plans, and all regulatory support documentation necessary to secure project approval under Section 404 of the Clean Water Act. Also served as Project Herpetologist to manage and review subcontractor investigations into the distribution and local habitat usage, impact assessment, and mitigation planning for protection of state-regulated populations of eastern

copperhead (*Agkistrodon contortrix mokasen*) and timber rattlesnake (*Crotalus horridus*).

Ponkapoag Pond Environmental Monitoring; Metropolitan District Commission; 2000–2002—Managed and implemented a pre-designed program of annual monitoring protocols designed to evaluate the ecological effect of surface water withdrawal from Ponkapoag Pond, a National Natural Landmark Site, in Canton, Massachusetts. Specific protocols for documenting plant community composition, avian species diversity, odonate diversity (three rare species), surface water flow, and groundwater elevations were employed.

Ballard Street Salt Marsh Restoration Project; New England Water Pollution Control Commission; 2001—Conducted and managed biological services, and coordinated the engineering and regulatory services, for a 30-acre proactive salt marsh restoration project developed by the Federal Coastal America Partnership in Saugus, Massachusetts. Specific achievements include securing written municipal sponsorship of the project, conducting four public information or project coordination meetings in Saugus and at the regional office of the Department of Environmental Protection, and coordinating the partnership-based development of preliminary project plans. Technical services included vegetation mapping, hydraulic structure documentation, alternatives analysis, preparation of permit packages and field inspections, coordination, and public representation as necessary to secure project approvals under the Massachusetts Environmental Policy Act, Massachusetts Public Waterfront Act, and Massachusetts Wetlands Protection Act.

Facility Expansion Program; Factory Mutual Insurance Company; 2001—Developed and managed a program of site investigation services related to wetland and wildlife-related constraints to expansion of existing testing and laboratory facilities on an 85-acre site in West Glocester, Rhode Island. Specific services included wetland delineation (under separate local, state, and federal methodologies), fisheries habitat identification and documentation, erosion control planning and design, stormwater management design, and construction-period monitoring. Also managed the preparation of permit package and field inspections, and coordination and public representation as necessary to secure project approvals under the Rhode Island Freshwater Wetlands Act.

Strait's Pond; Town of Hull, Massachusetts; 2001—Developed, managed, and implemented a program of insect population

studies and drafted control measures relative to spring swarms of Chironomid midges. Specific services included the implementation of a sampling program, coordination of a volunteer network, review of historic and existing chemical control measures, and development of a suite of alternative or hybrid measures for midge control.

Parker River Fish Passage Improvements; Parker River Clean Water Association, Inc.; 2001—Managed the preparation and permitting of plans to improve the passage of anadromous fish at the existing fish ladder along the Parker River at Central Street in Ipswich, Massachusetts. Design improvements provided by the U.S. Fish and Wildlife Service in this Coastal America Partnership project.

Facility Expansion; Cranston Print Works; 2001—Technical and regulatory services as necessary to secure state environmental approvals for a commercial facility expansion program in Cranston, Rhode Island. Specific technical services included wetland delineation, riverine habitat investigations, stormwater quality assessment, and engineering design modifications. Regulatory services include preparation of permit package and field inspections, coordination, and public representation as necessary to secure project approvals under the Rhode Island Freshwater Wetlands Act.

Athens Generating Project; PG&E National Energy Group; 2000–2001—Developed and managed a program of contracted services as environmental inspector for the construction of a new electric generation facility in Athens, New York. Responsible for compliance with project approvals under Article VII and Article X of the New York Public Service Law.

Town Creek Salt Marsh Restoration; Massachusetts Wetlands Restoration and Banking Program; 2000—Investigated current tidal hydrology; mapped historic and current distribution of common reed (*Phragmites australis*); and, in partnership with USACE–New England District and local stakeholders, developed a program of structure replacements and salt marsh channel modifications adequate to control the spread of common reed and improve fisheries habitat in 200+ acres of coastal wetlands in Salisbury, Massachusetts.

Walpole Cedar Swamp Restoration Project; Massachusetts Wetlands Restoration and Banking Program; 1998–2000—Conducted preliminary site investigations, mapped existing vegetation, and developed preliminary program of potential restoration activities at a regionally significant, 350-acre Atlantic white

cedar (*Chamaecyparis thyoides*) wetland complex in Walpole, Massachusetts. Developed a scope of services for contracted technical services in wetland restoration planning and design, participated in the contractor selection process, and served as third-party technical reviewer for contracted services.

Sagamore Marsh Salt Marsh Restoration Project; Massachusetts Wetlands Restoration and Banking Program; 1998–1999—
Provided technical and regulatory services as state sponsor for USACE-funded Section 22 environmental enhancement project at the USACE Cape Cod Canal facilities in Bourne and Sandwich, Massachusetts. Specific services included managing the delivery of contracted services for the required environmental assessment/environmental impact report under the National Environmental Policy Act and the Massachusetts Environmental Policy Act, additional state regulatory coordination regarding water supply protection, participating in baseline environmental monitoring programs for vegetation and rare species habitat (*Hemidactylum scutatum*), and identifying opportunity for and delivering project support under the Massachusetts Corporate Wetlands Restoration Partnership.

Christine Essick



Ms. Essick has more than 16 years of experience in environmental sciences and consulting. Her current responsibilities include the management and performance of ecological assessments, including all aspects of project planning, study implementation, data analysis and report writing. She has extensive experience evaluating impacted surface waters and sediments for Superfund, RCRA and State-led sites, as well as conducting wildlife and habitat inventories, wetland delineation and mitigation and threatened and endangered species surveys. Additional experience includes the collection of fish and benthic macroinvertebrates, sampling of water and sediment, and evaluation of analytical results from this sampling.

Registrations & Professional Affiliations

- Society of Environmental Toxicology and Chemistry (SETAC)

Fields of Competence

- Ecological risk assessment
- Habitat assessments
- Water quality studies
- Fate and transport modeling
- Plant taxonomy
- Wetland determination, delineation and mitigation
- Wetland and land development permit preparation
- Threatened and endangered species studies/surveys
- Fishery and benthic invertebrate surveys
- Taxonomic identification of fish and aquatic invertebrates

Education

- Master of Engineering, Engineering Science, Pennsylvania State University, December 2001
- B.S., Biology: Ecology, West Chester University, December 1989
- Training course on the Federal Manual for Identifying and Delineating Jurisdictional Wetlands of Pennsylvania, 1989, co-sponsored by the National Wetland Science Training Cooperative and the U.S. Army Corps of Engineers

Key Projects

For the Aerojet General Corporation, conducted screening-level ecological risk assessments for multiple source areas at a rocket test facility, one of the largest Superfund sites in California, located near Sacramento. Responsibilities included assisting in the development of a site-wide conceptual model and pathway analysis, and

an approach for evaluating ecological risks for terrestrial and aquatic biota at specific locations on the 9,000-acre facility under current and future uses. For the perimeter ground water operable unit (PGOU), project responsibilities included conducting screening level ecological risk assessments for soil and ground water, including a review of the ecotoxicity literature and derivation of aquatic risk benchmarks for perchlorate and NDMA. Also provided input and guidance to the design of sampling activities to support the ERA and health risk assessment process.

Developed wetland mitigation plans/proposals for multiple wetland areas impacted by remediation of contaminated stream sediments and banks in central New Jersey. Mitigation was required under the various New Jersey environmental permits issued for the remediation activities. Responsibilities included development of grading plans, planting plans and estimation of project costs.

Participated in a confidential siting study for a proposed off-shore LNG facility. Responsibilities included identifying and applying various siting criteria to a number of possible construction areas. Once the criteria were applied, a ranking system was developed to facilitate a comparative analysis of the various possible facility locations to assist the client in their decision making process.

Task Manager of an ecological risk assessment for a RCRA facility located on the Kanawha River in West Virginia. The purpose of the assessment was to evaluate whether site-related impacts to the river were occurring. The risk assessment evaluated surface water, sediment, aquatic habitat, benthic macroinvertebrate and fish data collected from the river during a four-week field investigation. The results of the evaluation demonstrated that site-related impacts, if any, could not be distinguished from numerous, off-site confounding impacts present in the river.

Participated in an evaluation of the potential for constructing an in-water Confined Disposal Facility (CDF) at the Cascade General, Inc. shipyard facility on the Willamette River in Portland, Oregon. The

evaluation included an assessment of the feasibility of the CDF from a practical, regulatory and financial perspective.

Task Manager of a sediment evaluation in a stream adjacent to a RCRA site in Delaware. The stream had historically been contaminated from a variety of upstream and downstream sources such that the designated uses of the stream including maintenance and propagation of fish species, secondary contact recreation, and maintenance of trout-stocked fisheries, were not being attained or were threatened due to toxic contamination. The primary constituents of concern included PCBs and pesticides (primarily DDT). Statistical sampling and analysis methods were employed to demonstrate contaminant distributions and concentrations adjacent to the site were not significantly different from upstream conditions.

Task Manager of a baseline ecological risk assessment conducted for a CERCLA facility located in southeastern Pennsylvania. The focus of the assessment was the evaluation of potential risks to ecological receptors associated with exposure to lithium, boron and hexavalent chromium in discharging ground water. Facility related ground water discharges to an Exceptional Value trout stream. The risk assessment included the collection and analysis of surface water and sediment analytical and toxicity data, benthic macroinvertebrate and fish sampling data, fish samples for histopathological evaluation and fish tissue samples. Food chain modeling was utilized to evaluate potential risks to higher trophic level receptors. The results of the risk assessment demonstrated that there was no evidence of a facility-related impact associated with lithium, boron and hexavalent chromium in surface water and sediment.

Prepared and obtained Freshwater Wetland and Waterfront Development permits for two sites in New Jersey as part of large-scale property acquisition and commercial redevelopment projects.

Task Manager of numerous ecological assessments conducted under Pennsylvania's Land Recycling Program (Act 2) and New Jersey's Technical Requirements for Site Remediation.

Steven C. Peterson, PhD



Dr. Peterson has 20 years of experience in environmental sciences, ecological research, and risk assessment with consulting firms, academic institutions, and government. He manages and conducts ecological risk assessments (ERAs), Natural Resource Damage Assessments (NRDAs), and related projects to address concerns with potential impacts of petroleum and chemical contamination on natural systems and human welfare. He has been at the forefront of developing and implementing innovative and cost-effective risk and injury assessment approaches for contaminants in ecosystems throughout the United States and internationally. On behalf of clients in both government and industry, he has provided risk assessment oversight, field investigation, peer review, guidance, sampling design, modeling, report preparation, and strategic planning for dozens of sites nationwide and internationally. Major sites include landfills, wood treating facilities, petrochemical facilities, industrial facilities, sewage treatment plants, hazardous waste incinerators, military bases, weapons facilities, oil spills, and mining sites.

He has broad expertise in the areas of evaluating potential exposure and effects of sediment, surface water, and soil contamination on terrestrial and aquatic food chains, especially involving petroleum hydrocarbons, mercury, PCBs, and other persistent and bioaccumulative contaminants.

Dr. Peterson is an expert in evaluating environmental risks of chemicals in commercial products under a variety of global regulations including TSCA and chemicals directives in the EU.

Registrations & Professional Affiliations

- Society of Environmental Toxicology & Chemistry (SETAC)

Fields of Competence

- Ecological risk assessment
- Human health risk assessment
- Natural resource damage assessment
- Contaminated sediment remedial investigations
- Contaminant fate & transport evaluations
- Litigation support
- Product risk assessment

Key Industry Sectors

- Aerospace
- Oil & Gas
- Government
- Transportation
- Utilities
- Chemical

Education

- Ph.D. Biological Sciences, State University of New York at Stony Brook, 1985
- B.S. Biological Sciences, University of Minnesota, 1978
- Editorial Fellow, The Quarterly Review of Biology, Stony Brook, NY
- NATO Postdoctoral Fellow, Population Biology, University of Leiden, The Netherlands
- Postdoctoral Associate, Biological Sciences, University of Maryland, Baltimore County

Publications

Peterson, S.C., L. Judd, K. Fletcher, B. Bennett, R. Predale, & D. Dolbow, 2004, *Chemical Risk Screening Approach to Evaluate Ingredients in Consumer Products for Sustainable Business Practices*, SETAC North American 25th Annual Meeting, Portland, OR.

Peterson, S.C., 2004, The Role of Ecological Risk Assessment in NRD, *Superfund and Natural Resource Damages Litigation Newsletter Vol. 1, No. 2*, August 2004, American Bar Association.

Essick, C.E., S. Peterson, & L. Judd, 2002, Strange Brew: Evaluating the Ecological Risks of Lithium and Boron-Impacted Ground Water Discharge, SETAC 23rd Annual Meeting, Salt Lake City, UT.

Peterson, S.C., 2001, Framework for Integrating Habitat Quality into Remedial Decision-Making for Ecological Risk Management at Contaminated Sites, Society for Risk Analysis Annual Meeting, Seattle, WA.

Peterson, S.C., 2000, "Mercury Remediation in Contaminated Ecosystems," SETAC Hudson-Delaware Chapter Workshop on Mercury Management in the New York New Jersey Region, Monmouth University, NJ.

Key Projects

Conducted screening-level ecological risk assessments at multiple operable units at a rocket test facility, one of largest Superfund sites in California, located near Sacramento.

For San Diego Unified Port District provided independent strategic and risk management review of contaminated sediment cleanup plans at former shipyard site.

Designed and led ERA for Carson River Mercury Superfund Site, Nevada, largest mercury-contaminated site in North America.

Evaluated ecological risk as a component of mitigation plans for Union Pacific/Southern Pacific railroad merger.

For City of Portland, OR, conducted risk-based investigations of sediment contamination in Columbia Slough, 20-mile long urban water body affected by storm water runoff and industrial discharges.

Conducted evaluation of disposal options for contaminated sediment at shipyard in Portland Harbor.

For Eastern Michaud Flats Superfund Site in Pocatello, Idaho, as member of technical advisory committee, conducted extensive, multiphased risk assessment addressing trace element contamination from two adjacent phosphate ore processing facilities.

Developed ERA and NRD guidance for U.S. Department of Energy to address site impacts for 890- square-mile facility at Idaho National Engineering and Environmental Laboratory.

Provided strategic support on Baseline Ecological Evaluation (BEE) at site in Passaic River, New Jersey watershed.

For chemical manufacturing facility in New Jersey, designed and conducted sediment and surface water sampling studies in small tributary to Delaware River to support Superfund RI/FS and ERA.

Supported clients with evaluation of potential natural resource injuries at several industrial sites in New Jersey, involving ground water and surface water contamination.

For US Army Corps of Engineers, conducted BEE for 2-mile long, 679-acre facility located in New York/New Jersey Harbor undergoing RI/FS to support future redevelopment and reuse.

Conducted assessment of PCB and dioxin data to evaluate transport, fate, and potential ecological and human health risks in contaminated wetland at industrial facility in Massachusetts.

At former nuclear power plant in Massachusetts, designed fish sampling approach and conducted human health and ERAs to evaluate impact of PCBs in sediment on recreational fishery.

At federal Superfund site in Massachusetts, assisted PRP group with scoping and identification of data needs for ERA in wetlands adjacent to landfill.

For chemical manufacturing facility in Massachusetts, conducted risk assessment and feasibility study for cleanup options at former cooling pond impacted by plasticizers and metals in sediments.

Conducted field studies and risk assessment projects for remedial investigation/feasibility study to address streams, wetlands, and terrestrial habitat on 9,600-acre Fort Devens Military Reservation and 2,500-acre Sudbury Training Annex in Massachusetts.

Directed ERA activities for several Superfund sites in southeastern Pennsylvania, involving streams and wetlands impacted by heavy metals and organic chemicals.

Prepared Screening Level Ecological Risk Assessment (SLERA) for oil-recycling site along Christina River in Delaware.

Served as expert witness in case involving release of fluoride in air emissions from manufacturing facility in Pennsylvania.

In support of RCRA Facility Investigation at chemical manufacturing facility on Delaware River shoreline in Pennsylvania, conducted ERA evaluating potential impacts to surface water and sediment from groundwater plume.

At former wire manufacturing facility on lower Hudson River, designed investigations and evaluated fish and wildlife impacts of PCBs and metals in sediment under consent order with New York State.

At pharmaceutical company research center in Connecticut on Long Island Sound, directed implementation of long-term monitoring plan for constructed salt marsh at former junkyard.

At Union Ship Canal in Buffalo Harbor, NY, evaluated impacts of contaminants from former industrial sites on canal sediments and wetlands fringing the canal, and developed sampling plan to address potential ecological effects of PCBs adjacent to outfall.

Provided expert witness services related to mercury contamination at Onondaga Lake, NY, federal Superfund site.

Through client counsel, evaluated alleged impacts of metals and microbial growth in wastewater discharging to nearby creek at manufacturing facility in New York State.

To support food chain analysis for aluminum smelter at one of largest remediation sites in New York, led field collection of 4,000 sediment, water, and fish samples for laboratory analysis to determine extent of PCB and metals contamination in sediments and food chain bioaccumulation over 8-mile stretch of Grasse River near Massena, NY.

Conducted technical review of over 20 years of historical studies to evaluate data supporting natural resource damage claim for contaminated sediments in wildlife refuge, Jamaica Bay, NY, administered by National Park Service.

At former Griffiss Air Force Base, Rome, New York, assisted U.S. Army Corps of Engineers with reviewing risk assessments and developing remedial plans for several miles of creek bed contaminated with PCBs and other chemicals.

For insurance company, evaluated potential for NRD claims at three manufactured gas plants, and estimated expected annual claim values to support underwriting of pollution legal liability insurance coverage at three sites.

For major oil company, directed human health and ERAs to support risk characterization of petroleum-impacted sediments at oil terminal in remote location on Louisiana Gulf Coast.

Prepared bird survey and habitat characterization report to evaluate environmental impacts of implementing clear zone around weapons storage area.

For Bandelier National Monument, Los Alamos, New Mexico, led ERA to determine effects of DDT contamination in soil and sediment on riparian and aquatic receptors.

At former refinery in Ohio, conducted facility-wide ecological and human health risk assessment for petroleum contamination in groundwater, soil, surface water, and sediment under RCRA consent order.

Appointed to nationwide technical advisory panel by USEPA Risk Assessment Forum to evaluate risk assessment for WTI Incinerator in East Liverpool, OH, one of most controversial hazardous waste incinerators in U.S.

For coal company in support of anticipated natural resource damage claims and related litigation, initiated development of strategy and bioassessment approach for evaluating impacts of coal fines on several miles of affected streams in eastern Kentucky resulting from release of 250 million gallons of slurry from an impoundment collapse.

Directed ERA to evaluate potential effects of a pilot study for constructed wetland designed to treat groundwater contaminated with volatile chlorinated hydrocarbons.

For Environmental Protection Department of Hong Kong Special Administrative Region Government, supported development of ecological screening criteria for contaminated land.

Conducted SLERA for a manufacturing facility in Brazil, located in the Atlantic Rainforest.

For site in Italy, provided ERA for discharge of chlorinated volatile organics in groundwater to wetlands area designated as nature preserve.

Evaluated ecological impacts of oil fires and spills on terrestrial and coastal resources of Kuwait following 1990-1991 Gulf War.

For a major multinational consumer products company, conducted risk assessments and reviews under European Commission (EC) Directives on risk assessment for new and existing substances, including surfactants, complexing agents, preservatives, solvents, and fragrances.

For BP Product Stewardship & Toxicology, developed product risk assessment approach for petrochemicals manufactured and used by BP worldwide.

Kate Sullam



Ms. Sullam is a Senior Consultant in the Strategic Services team, focusing on the provision of specialist advice to help clients identify and manage the social aspects of their business and related developments. Ms. Sullam is predominantly a socio-economist, but has acquired a wealth of experience in providing assurance services and strategic advice to clients especially in the area of sustainable development. She has 8 years of experience working with local and international companies, NGOs, donor agencies and government, which has given her an insight into the complex issues and dynamics unique to each sector.

Recent experience includes project management of a complex Eur 4.3 million EC funded project providing sustainable development and coastal management technical assistance to ten countries in the Mediterranean region; socio-economics impact assessment of a highly controversial proposed aluminium smelter in Trinidad and Tobago; development of a dynamic tool to help corporate members of the WBCSD to measure their impacts on development in their locations of operation; and completion of a Environmental and Social Management Framework, a tool to facilitate implementation of a US\$40million World Bank funded poverty alleviation programme in Western and Central Kenya.

Fields of Competence

- Socio-economics
- Sustainable development strategy and policy
- Social impact assessment
- Stakeholder engagement and partnership brokering
- Corporate Social Responsibility (CSR)

Key Industry Sectors

- Extractive (Oil, gas, petrochemicals, mining)
- International development (donor agencies, NGOs, Civil Society organisations)
- Metals
- Telecommunications
- Fisheries

Education

- Partnership Brokering Accreditation Scheme, ODI/IBLF, London, UK, 2004-2005
- MSc Environmental Technology: Global Environmental Change and Policy, Imperial College London, UK, 2002-2003
- ACA Association of Chartered Accountancy, ICAEW, UK, 1998-2001
- BA (Hons) Economics and Statistics with European Studies (French). University of Exeter, 1993-1997

Languages

- English, native speaker
- Good French and working Spanish

Publications

- Global fish stock depletion- a slippery problem; Ocean Legacy (both papers for presentation at the World Economic Forum in Davos, Jan 2006)
- Partnerships in action, keynote presentation for Institute of Business, Trinidad, May 2005;

- Making the private sector business case for partnerships, ODI (PBAS), London, Mar 2005;
- The Role of EU Fisheries Licensing in Environmental Management, IEEP, London, Dec 2003.
- Fisheries Agreements with Third Countries- Is the EU moving towards Sustainable Development? IEEP, London, Nov 2002.

Key Projects

Strategic and social impact assessment

Development of methodology to measure business impact on development, World Business Council for Sustainable Development (WBCSD), ongoing. ERM is leading a workstream consisting of multi-national companies from a wide range of industries to facilitate the development of a tool that will be rolled out to enable businesses across the world and from different sectors to understand and measure their impacts on development. As project manager of this initiative, Ms. Sullam is undertaking stakeholder engagement, providing appropriate content input and mobilising the workstream to help drive forward the initiative.

Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) for World Bank funded community driven development and natural resources programme, Kenya, 2006.

Preparation of social management aspects of the ESMF and RPF to provide guidance to the implementers of this proposed US\$100million funded World Bank project in Western Kenya and Central Province on how to integrate and manage social impacts within the project boundary.

Socio-economic impact assessment for Alcoa, for the controversial construction of a proposed aluminium smelter in Trinidad, ongoing. Acting as lead consultant on the social aspect of a full EIA being undertaken for the proposed construction, as part of an international team. This controversial smelter project has come under significant public criticism even resulting in violence, and therefore subject ERMs work to a high level of scrutiny. A robust assessment is being developed to enable informed discussions to take place and to manage public uncertainty over potential adverse impacts of the site. This combined with extensive stakeholder consultation is

helping to strengthen relations in particular with anti-smelter campaigners.

Socio-economic impact assessment for confidential petrochemicals client for site development in the Middle East, 2006. Supported a petrochemical company in the mainstreaming of sustainable development considerations into their commercial proposal to the national government for developing an operation in the Middle East. This was complimented by a socio-economic impact assessment, a key focus of which is the impact on local communities using affected areas for livelihood activities, wider long-term socio-economic impacts and understanding the project in the context of other developments in the area.

Strategic impact assessment (SIA) of future exploration activities in the Arctic region for confidential oil & gas client, 2006. Social specialist in a larger SIA team carrying out an integrated impact assessment for proposed exploration activities in the Arctic. This involved strategic scenario development given potential future commercial, political and social conditions and assessment of related social impacts. This is being used by the client to form the foundation for their future investment planning activities in the region. The project undertook extensive stakeholder consultation with affected communities and wider international stakeholders.

Socio- Economic Analysis of the North East Atlantic marine eco-region, WWF, 2004. Ms. Sullam led an analysis of the North East Atlantic marine eco-region to identify the key socio-economic drivers of fisheries loss and climate change in the area at a UK and EU level. This work resulted in the prioritisation of action areas for WWF Europe to focus on in order to maximise their influence over highlighted problems in the region.

Project management of policy and livelihood research project for IIED and social NGO in Cusco, Peru, 2003 Led the planning and management of a policy and economic impact assessment of rural communities in Cusco, Peru, to be affected by a regional tourism development programme. This involved coordination of a team comprising external consultants and field staff for execution of data collation techniques including ongoing training and review. She subsequently developed an

analytical model demonstrating the influences of the local and national policies on social and environmental assets drawing recommendations as to how to manage these impacts going forward.

Sustainability impact assessment of changes in EU fisheries legislation, Institute of European Environmental Policy, 2002.

Coordinated research collation, stakeholder engagement and report preparation for WWF, analysing the impact on sustainability of the fishing industry of changes in the funding criteria of the EU Common Fisheries Policy. The timely publication of this report acted as a catalyst for the EU to halt its funding obligations to increase fishing effort, and is still widely quoted to support ongoing discussion in the area.

Social and environmental impact assessment of changes in EU-African fisheries agreements, Institute of European Environmental Policy, 2002. Managed research, analysis and report preparation on the environmental and social implications and future sustainability of proposed changes to the latest EU-African fisheries agreements. This report supported the ongoing international debate regarding the EU's emerging trend of exporting overfishing issues and exploiting natural resource rich developing nations for short term gain.

Socio-Economic Assessment of development plan in Sheffield, UK for British Land, 2004. As part of an economic development masterplan proposal, Ms. Sullam led the socio-economic baseline appraisal and economic positioning of a sustainable development strategy for highly deprived area in Sheffield.

Socio-Economic Impact Assessment of proposed development site in Hackney, UK, 2004. Ms. Sullam carried out the impact assessment of a proposed mixed use development involving a detailed socio-economic profile of the Hackney area of London and identifying its temporary and permanent social impacts and multiplier effects. This work supported the planning application for development of the site which was subsequently approved.

Sustainable development strategy and policy

Provision of technical assistance under the EC funded, Small and Medium Term Action Plan (SMAP) III programme in ten Middle-Eastern Mediterranean countries. Project manager of this highly complex, Eur 4.3million, three year project to deliver technical assistance in ten middle-eastern countries in the areas of sustainable development and integrated coastal zone management.

Development of strategy for partnership development and private sector engagement as a route to achieving the MDGs, United Nations Development Programme, Trinidad and Tobago, 2005.

Ms. Sullam guided an exploration of the opportunities for building multi-sector (government, civil society, private sector) partnerships as a means to delivering UNDP T&T's MDG objectives, and developed a strategy outlining the optimal process of private sector engagement and partnership-building/ execution to achieve this. This involved extensive stakeholder engagement and impact assessment as well as provision of partnership brokering training to key programme staff to ensure sustainability of assignment outcomes.

City Growth Strategy, Department for Trade and Industry, 2004.

Ms. Sullam coordinated the evaluation of the first phase of a national programme of pilot partnership projects across the UK. This project was commissioned by the government Department for Trade and Industry, to assess the barriers to progress, achievements and learning points from the pilot phase of the City Growth Strategy initiative, in order to inform the roll out, and improve execution of the next phase.

City Growth Strategy (phase 1), Park Royal Partnership, London, 2004.

Ms. Sullam coordinated and project managed the first phase of a regional private-public partnership in London, involving three local authorities, one regional government body and several multi-national corporations. This is a £1million programme funded by the Department of Trade and Industry to facilitate development of a sustainable development strategy to regenerate inner-city areas in the UK. This involved extensive stakeholder engagement

and relationship building with political diplomacy applied to overcome inter-stakeholder conflict. Ms. Sullam facilitated the creation of a Strategy Board with the remit to achieve economic growth and deliver social and environmental objectives. She also developed and executed an effective exit strategy to ensure continued sustainability of the partnership.

Sustainable Coastal Livelihoods Project, Greenforce, Fiji, 2001. Ms. Sullam was part of a core team focusing on the development of a sustainable management plan for resulting tourism with a view to supporting local livelihoods. This involved close liaison with the local island community in order to achieve data collection for assessment of current coastal activities and future sustainable development opportunities.

Development of key performance indicators for forestry, retail and textile industries, IFC, 2004. Ms. Sullam was part of the core team commissioned to develop a set of key performance indicators for three industries to enable IFC to undertake robust appraisal of financing opportunities for their sustainability.

BT global environmental reporting strategy, 2004. Ms. Sullam designed and executed a questionnaire to assess the quality of environmental data across global territories in order to support the development of a framework to report global environmental data in the future. This required coaching and co-ordination of 8 local BT territories in order to facilitate the assessment of existing processes.

Development of ethical company strategy and policies for local regeneration charity, 2001. Ms. Sullam led the planning and management of a key project to improve internal management and communication systems and enhance quality of donor reporting to government bodies, whilst integrating underlying ethical objectives. This resulted in the development of a revised company strategy and set of policies and the creation of internal committees to oversee implementation of recommendations.

Evaluation and assurance

Monitoring and evaluation of social activities for energy company in Turkmenistan, 2006 and 2007. As part of a full HSEC audit, Ms. Sullam provided the social expertise to assess appropriateness and effectiveness of internal stakeholder engagement and outreach procedures and programmes. This involved extensive stakeholder engagement with local communities and ministries to understand in-country social, environmental and health issues and the drafting of a report providing recommendations to add value to current activities.

Verification of Umicore's 2005 and 2006 Environmental and Social Report, Belgium. ERM was invited to carry out independent verification of Umicore's sustainability report by building on previous report verification activities in the last five years to introduce new challenge and fresh ideas. The review incorporated additional focus on management of social impacts, as well as greater emphasis on group-wide sustainability management. Involved visits to sites across Asia and Europe to investigate extent of on the ground activities in accordance with Corporate expectations.

Assurance of environmental, health, safety and social performance data, Shell Chemicals and Shell Exploration & Petroleum, 2004-2005. As part of the central assurance team, Ms. Sullam led the management and coordination of the Chemicals and Exploration & Petroleum parts of the Shell Assurance work for both the 2004 and 2005 sustainability reports. This involved coordination of nine international site teams including Nigeria, communication with client at both business and site level, and provision of recommendations for the improvement of processes governing the collation of non-financial information for six key performance indicators.

Assessment of procedures governing selection of Location Reports with respect to ensuring assurability, Shell International, 2004. Ms. Sullam worked closely with senior members of Shell corporate and several external stakeholders to analyse the existing procedures for selecting the highly controversial Location Reports, and provided recommendations as to where improvements should be made in order to enable assurance of the process in the future.

Sita Krafchow Hess, J.D.



Ms. Krafchow Hess is a consultant in ERM's New York, New York office. After practicing as an attorney, Ms. Hess joined ERM over three years ago specializing in Mergers and Acquisitions and Environmental, Health and Safety (EHS) Compliance Assurance services. As a licensed non-practicing attorney, Ms. Hess offers a diverse skill set and a wealth of knowledge to ERM's clients. Her experience with ERM includes: (i) mergers and acquisitions (M&A) services pertaining to managing multi-site domestic and international due diligence projects; (ii) environmental, health, and safety (EHS) compliance auditing services including managing national and international audit programs which entail regulatory, corporate standards, and management systems; and (iii) conducting and supporting various compliance assistance projects ranging from the development of global EHS standards for heavy manufacturing operations, to managing risk assessment projects, to the development and coordination of global EHS summits/conferences for major corporations. Ms. Hess has worked on projects encompassing over 100 facilities in more than 20 countries.

Registrations & Professional Affiliations

- Licensed Attorney
- New York, 2002
- New Jersey, 2002

Fields of Competence

- Mergers and acquisitions/due diligence
- Auditing
- Project management
- Environmental and Health and Safety compliance auditing
- National and international compliance assistance

Education

- J.D., Benjamin N. Cardozo School of Law, June 2000
- B.A., University of California at Santa Barbara, June 1996

Key Projects

Compliance

US, Canada, Mexico, UK and Europe, 2004-2006 Project Manager

Project Manager for multiple-site international and domestic post-merger compliance assistance project for a publicly held cable manufacturer with more than 19 facilities in nine countries. Project was a two-plus year effort with a budget of three million dollars. Project entailed EHS compliance audits and full scale EHS development and implementation of EHS programs to create a proactive compliance culture at the acquired facilities. Responsible for all aspects of integration with parent company's compliance program. Reviewed and

edited industrial hygiene reports, noise assessment reports, risk assessment reports, EHS compliance audits, and post-site visit memos. Served as principal liaison between facilities and corporate EHS Director. Put systems in place to ensure that the client's needs were met and the team's activities and outcomes were consistent and timely. Assisted EHS Director with various corporate needs including information and data management solutions.

US, Canada, Mexico, and Europe, 2004-2006

Project Manager

Project Manager for large scale multi-media compliance auditing program for an auto parts manufacturer encompassing nearly 70 facilities in 13 countries. Responsibilities included the development of audit protocols, pre-audit plant level packages, auditor training and preparation, audit scheduling and final report review and edits. Supported the user functionality and provided on-going management of ERM's interactive web-based audit finding tracking system (www.dotright.com).

Europe, Singapore, Brazil, 2005

Project Manager

Project Manager for EHS regulatory compliance audits for makers of health care medicine delivery components. The audits encompassed nine facilities in seven countries. Responsible for all aspects of team management including invoicing, generation and management of budgets and time, report review, and project staffing. Served as principle liaison for client.

US, 2004-2005

Program Manager

Coordinated an EHS compliance audit project including 40 facilities in the US for a *Fortune 100* chemical manufacturing company. Responsibilities included editing the audit reports, ensuring they conformed to corporate template and legal needs, liaising with the client and the client's attorneys for changes to the reports, and ensuring that the client received the reports in a timely manner.

Strategic Advice

US, 2005-2006

Assistant to the EHS Steering Committee

Assisted the EHS Steering Committee of auto parts manufacturer in crafting of their compliance auditing program and drafting and editing of their Global Standards. Served as the main point of contact for the Global Standards project, tracking progress and release for efficiency. Assisted the EHS Director and EHS Manager with various initiatives.

Due Diligence and Environmental Site Assessment

US, 2005

Assisted with Phase I environmental due diligence assessments for a university and for a printing operation. Performed the site walk-throughs, analyzed data, and generated reports.

US, 2004

Due Diligence Team Member

Team member on two-week project involving acquisition of 100 hotels. Analyzed EDR data for 20 sites.

Site Investigation and Remediation

The Netherlands, 2005-2006

Project Manager

Project Manager for Site Investigation and Remediation project in the Netherlands for publicly held cable manufacturer. Responsible for all client interaction, updates, staffing, report and proposal review, and budgeting.

Katherine Muehr



Ms. Muehr is a Project Economist based in ERM's Austin, Texas office. Ms. Muehr has 3 years of experience in the field of economics in support of environmental consulting. Her experience primarily involves applying economic solutions to technical environmental problems, including econometric support to groundwater and soil scientists; preparation of an industry review of sustainable development in the oil and gas sector; socio-economic evaluation for potential property end uses for a portfolio of sites across North America; cost modeling for multi-site portfolios including uncertainties with costs and future timing; analysis of socio-economic impacts as part of National Environmental Policy Act (NEPA) assessments; and cost-benefit analysis of an soil vapor extraction (SVE) system for improving overall financial and economic efficiency at an ongoing remediation site.

She has academic training in all areas of economics, including development and globalization, econometrics, urban and labor economics, and industrial organization and regulation.

Fields of Competence

- Renewable/wind energy market and economics
- Economics and econometrics
- Statistics
- Quantitative analysis of technical and financial data
- Facility site-end use and redevelopment
- Sustainable development policy
- Corporate sustainability policy
- Uncertainty cost modeling
- Financial Accounting Standards Board (FASB) 143/FASB Interpretation Number (FIN) 47-modeling uncertainties of Contingent Asset Retirement Obligations

Education

- BA, Economics, Harvard University, USA, 2003

Languages

- English, native speaker
- Spanish, some familiarity

Key Industry Sectors

- Oil and Gas
- Petrochemicals
- Manufacturing
- Government
- Energy
- E&P

Key Projects

Prepared economic section of a Socioeconomic Impact Assessment of a potential LNG port in Massachusetts Bay, with a focus on impacts to local fisherman and the fishing industry, including suggesting potential mitigation to off-set negative economic effects to the industry.

Calculated cost-benefit analysis of use of an SVE in place of and in conjunction with ongoing remediation at active refinery in West Texas. Analysis showed that use of an SVE would provide overall economic benefit to client to reduce environmental liability and environmental reserve quicker and more cost-effectively than current remediation technology.

Researched and developed site background information from an economic and sustainable development perspective for potential site end-use to tie in with client's ideals of sustainable development for multiple former refinery sites in Kansas and Texas.

Provided economic and econometric support to an analysis of freshwater wetland mitigation and the potential value of avoiding a Natural Resources Damage Assessment at a major oil refinery in Texas.

Researched general energy industry and renewable/wind energy specific information for Superfund site currently in remediation for sustainable end use to become a financial asset for the property owner.

Provided economic and econometric support to an analysis of site end-use, site restoration and management of environmental liability at a former oil refinery in Texas.

Provided comments to plaintiff's expert economist's opinion on litigation case for defendant on Mississippi site.

Developing site and portfolio management analysis tools for large oil and gas client to use on refinery remediation project and across client's portfolio of remediation sites.

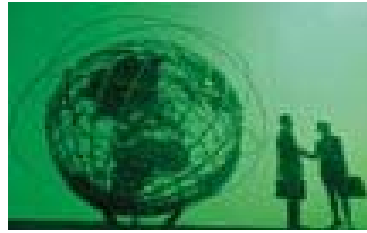
Provided statistical and trend analysis of ground water chemistry data at Superfund site. Results supported hypothesis that Arsenic was naturally occurring in the ground water resulting in lower remediation costs and reduction in client's environmental reserve for the site.

Due diligence support for international client; researched Minerals Management Service, State Oil and Gas regulatory agencies, and other public information sources for potential incidents of non-compliance (INCs), Notices of Violation (NOVs), well status (such as P & A and temporarily abandoned) and other pertinent information to report to the client for possible acquisition of exploration and production company. Conducted cost model analysis of Asset Retirement Obligations for both onshore and offshore assets including comparison of artificial reef to onshore removal options.

Due diligence support for international client; researched public information sources for possible acquisition of offshore exploration and production company and conducted economic analysis of asset retirement obligations and potential salvage value.

Conducted uncertainty cost modeling for multi-site portfolios in relation to FASB 143 with FIN 47-Contingent Asset Retirement Obligations. Model included uncertainties in both timing and cost and comparison of individual costs to entire portfolio cost.

Lori K. Magyar



Ms. Magyar has experience in a variety of large multidisciplinary environmental, social and health programs throughout the United States and overseas. She specializes in project management, emergency and oil spill planning and response, regulatory compliance services, stakeholder information and adult education programs, field investigations, research, and environmental impact assessments/statements for a broad range of private sector and government clients.

Registrations & Professional Affiliations

- Disaster Recovery Planner, 1992
- Incident Command System, 1991

Fields of Competence

- Project management
- Training coordinator/facilitator
- Community relations/stakeholder involvement
- Environmental impact statements/NEPA
- Regulatory compliance
- FERC
- Environmental documentation
- Social interaction with Native Associations
- Resource analyses

Education

- B.A., Human Resources/Organizational Administration, Alaska Pacific University (1992)

Key Projects

Developed an emergency communication plan for BP Exploration Government and Public Affairs, Anchorage, Alaska. Plan included communication with local native associations.

Developed the Earthquake Awareness Program for BP Exploration, Anchorage, Alaska. Provided brochures, training, and home preparedness for over 1,200 employees and contractors.

Presented stakeholder information and education materials on the Arctic National Wildlife Refuge at conferences on behalf of the Alaska Oil and Gas Association.

Consulted to ExxonMobil for Chad project operations to develop the environmental management manuals, socioeconomic manuals, and regulatory compliance manuals for Chad and Cameroon during operations and maintenance of the project.

Consulted to ABB Lummus Global on the Sakhalin Island Development Project. Provided authorship of the environmental management plan and socioeconomic plan - including interaction with natives to the island, designed and assisted in development of a project environmental database, and identified appropriate staffing to support client in the waste management, safety, and environmental areas.

Consulted to ExxonMobil on the Sakhalin Island Development Project. Provided authorship of the environmental management plan, waste management plan, socioeconomic plan and health plan to be used by each EPC contractor to develop plans for use during construction.

Consulted to ExxonMobil on the Chad Development Project. Services included managing change in the environmental management plan documentation, reviewing subcontractors environmental management plans for completeness, training environmental monitors in responsibilities.

Managed stakeholder meetings, agency and non-governmental meetings, data gathering, technical writing and analysis of impacts for the Texas SH 35 corridor study.

Coordinated the preparation of a comprehensive environmental impact statement for the development of a container terminal and associated documents. Responsibilities included coordination with regulatory agencies, non-governmental organizations, managing human resources activities, coordinating daily activities, coordinating GIS mapping and providing technical writing for the project.

Managed the stakeholder involvement, data acquisition and field surveys required to successfully permit an 18-mile offshore pipeline in the Gulf of Mexico. Provided technical support for environmental studies and meetings with the USACE. Assisted in development of mitigation plans.

Provided contract coordination and stakeholder involvement activities for the Texas General Land Office, Coastal Erosion and Protection Program along the Texas Gulf Coast.

Coordinated ordinance and explosive waste engineering evaluation and cost analysis of Dutch Harbor, Alaska for the US Army Corps of Engineers. Directed all aspects of the field investigation as well as implementing the work plan and quality assurance/quality control, coordinating all stakeholder involvement activities including work with native associations, maintaining field records, documenting locations through a GIS and technical writing for the report.

Managed stakeholder involvement program/RAB of Delta Junction, Alaska. Responsible for providing stakeholder relations guidance to the US Army Corps of Engineers for community involvement program at Ft. Greely for ordinance and explosive waste investigation and removal activities. Performed door to door interviews and public meetings.

Managed pollution prevention booklet and video for the U.S. Air Force and cooperating agencies.

Responsibilities included daily management of staff and subcontractors, assisting in video and booklet development, and final review of documents before publication.

Provided coordination of all community meetings and native association meetings, development of newsletters and presentation materials, technical editing and document production coordination for the IMS Infrastructure Improvement Project EIS in Seward, Alaska. Key issues addressed in the EIS included air quality, noise, wildlife resources, and land and shoreline use.

Managed a Geographical Information System (GIS) project for Houston Airport System Planning Department to develop a system-wide sharing of data and maps.

Coordinated the preparation of a comprehensive supplemental environmental impact statement for the disposal and reuse of Kelly Air Force Base and associated documents to address civilian and military use of the runway.

Coordinated the preparation of an environmental assessment and 19 supporting documents in French and English, responding to World Bank and IFC comments, development of associated technical documents, and execution of supplemental field data collection for the Chad Export Project.

Coordinated the preparation of a comprehensive third party environmental impact statement and associated documents for the first offshore oil and gas development project in the Alaskan Beaufort Sea. Provided senior technical review and contract management for a long-term property acquisition program in the Gulf Coast utilizing GIS to rank and prioritize property to be acquired based on the environmental and financial data for each tract.

Developed and coordinated a mining reclamation plan meeting regulatory requirements for a mining site in Alaska.

Managed a team selected to develop the environmental management plan for the facilities contractor on the Chad Development Project. Responsibilities included technical writing and editing, coordinating team, which included other contractors, and schedules, and served as point of contact for client. Coordinated social interactions with native groups.

Managed the development of an environmental management plan for a prime contracting consortium. The plan provided the environmental monitoring requirements and guidelines for construction activities to support Chad Export Project in Chad and Cameroon, Africa. The project involved the development of a large oil field and construction of several related facilities in both countries. Developed socioeconomic action plans for interaction with local peoples and native groups.

Managing the development of Federal Energy Regulatory Commission (FERC) Resource Reports for a natural gas salt cavern storage facility and pipeline in Southeast Texas. Provided technical writing and client coordination for the preparation of the reports.

Managed the development of Federal Energy Regulatory Commission (FERC) Resource Reports for an LNG facility and pipeline for ExxonMobil Development Company in Southeast Texas and Western Louisiana. Provided technical writing and client coordination for the preparation of the reports and field surveys. Coordinated field surveys, data gathering, GIS program, technical writing, review of reports, submission to the FERC and response to the FERC comments.

Authored the development of oil discharge, prevention, and contingency plan for Venezuela operations.

Authored vulnerability analyses and developed containment strategies and logistics for 17 Gulf Coast terminals in accordance with 40 CFR 112 as required by the Environmental Protection Agency for marine transportation and non-transportation related onshore facilities.

Provided SPCC plans for seven Southwestern Bell locations across remote areas of Texas.

Managed and provided oil spill response for a World Bank project in Nefteyugansk, Siberia to provide the equipment and training necessary to implement a long term environmental program. Main elements included environmental management, environmental clean-up and emergency spill response, environmental monitoring, pipeline corrosion, and development of GIS and mitigation measures.

Authored vulnerability analysis and developed containment strategies and logistics for a transportation operations center in Memphis, TN in accordance with 40 CFR 112 as required by the Environmental Protection Agency for non-transportation related onshore facilities.

Performed worst case discharge analysis and supervised the development of facility maps in GIS for ExxonMobil Baytown on the Gulf of Mexico as required by the Environmental Protection Agency for marine transportation related facilities.

Managed and authored emergency management plan for joint venture drilling services in Anchorage, Alaska. Developed an emergency management plan for the North Slope drilling operation.

Managed incident command system training program designed specifically for oil operations client in Richmond, California. Developed and executed a one-day training session followed by a tabletop exercise including full equipment deployment.

Managed development of oil discharge, prevention, and contingency plans for Alaskan exploration operations through the agency review, comment, and approval cycle. Coordinated meetings with native associations.

Provided on-going support for shared services drilling including development of an emergency response plan, providing training classes and tabletop exercises for office and oilfield employees.

Coordinated oil spill response OPA90 plans for Northwest terminal operations through the agency review, comment, and approval cycle.

Participated in design, control, and evaluation teams responsible for developing the drill objectives, creating scenarios to test objectives and permit evaluation, assisted in developing evaluation document.

Coordinated drills, assisted in the scenario design, and coordinated consultant and company involvement for such projects as: Prince William Sound Oil Spill Drills, Alaska, North Slope Oil Spill Drills, Alaska, Medical Disaster Exercises and Drills, Alaska, Well Blowout Exercises and Drills, Alaska, Offshore Well Blowouts, Texas, Arco Terminal Spill Drill, California.

Consulted with Willbros on a Nigeria project. Provided authorship of the environmental management plans required by ExxonMobil. Work performed in Houston with Willbros Nigeria staff providing responses to information requests.

Jacquie Payette



Ms. Payette has more than thirteen years of experience in cultural resources management. Ms. Payette has worked as a consultant for private industry, academic institutions, and federal agencies. This range of experience has given Ms. Payette a broad view of federal and state compliance regulations from different angles. Ms. Payette has worked in numerous geographical regions throughout North America.

Ms. Payette deals directly with State Historic Preservation Offices and federally recognized tribes in more than forty states, including Michigan, on behalf of clients in compliance with the National Historic Preservation Act and the National Environmental Policy Act. Ms. Payette's experience includes hundreds of cultural resource projects from archaeological surveys through full excavations, historic structure surveys, analysis of numerous archeological assemblages, contributions to numerous cultural resource reports, and teaching at the university level. Ms. Payette also has experience in Phase I Environmental Assessment auditing.

Registrations & Professional Affiliations

- Register of Professional Archaeologists
- Ohio Archaeological Council

Fields of Competence

- Phase I Archaeological Survey
- Tribal Consultation, with well established relationships with tribes in most regions of the continental US, including the northeast, midwest, southeast, northeast, and southwest.
- Phase II Evaluative Archaeological Testing for historic and prehistoric archaeological sites
- Phase III Mitigation for impacts to historic and prehistoric archaeological sites
- Analysis of human and faunal osteological remains from historic and prehistoric archaeological sites
- Analysis of bone tools and implements from archaeological assemblages
- Historic documentary research
- Historic structure architectural survey
- Line-of-sight drawings from historic properties to proposed project facilities
- Development of research and fieldwork designs for cultural resources compliance projects
- Compliance with federal and state cultural resource regulations, including National Historic Preservation Act, National Environmental Policy Act, the Federal Communication Commission's Nationwide Programmatic Agreement, and Native American Graves Protection and Repatriation Act.
- Predictive modeling for likelihood of archaeological sites in specific locations

- National Register of Historic Places eligibility evaluation for historic structures
- Consultation with members of the public, and local government agencies
- Development of Memoranda of Agreement
- Development of Historic Property Management Plans and Preservation Covenants
- Environmental Assessments in compliance with the National Environmental Protection Act
- Cultural resources portions of Environmental Impact Statements
- Phase I Environmental Assessment Audits
- Communication, verbal and writing skills for both mid level and senior management audiences
- Wetlands Delineation

Education

- M.A., Anthropology, focusing on Archaeology and Physical Anthropology, University of Pittsburgh, 1996
- M.A., English, Kent State University, 1987
- B.A., English, Kent State University, 1985
- Wetland Delineation and Management Training, Richard Chinn Environmental Training, 2001
- Hazardous Waste Operations and Emergency Response 40-hour Training, North Central Environmental and Industrial Safety Training Center, 2001 (8-hour Refresher Training current)

Publications

Payette, Jacqueline M., Lynelle Peterson, and Edwin Hajic, "Investigations at the Vestal Site (24FR760): An Avonlea Bison Processing Site", *Archaeology in Montana*, Vol. 47, No. 1, 2006.

Payette Jacqueline M., various co-authors, several hundred reports on Phase I archaeological surveys for FCC undertakings, nationwide, 1998-present.

Payette, Jacqueline M., *Phase I and II Cultural Resource Investigation of Proposed OH Neelysville ARP Telecommunications Tower Project Area, Including Site 33MG183, Mill Grove Vicinity, Meigsville Township, Morgan County, Ohio*, 2003.

Payette, Jacqueline M., *Phase I Cultural Resource Survey: Proposed Commerce Street Industrial Park Expansion, Grafton, Lorain County, Ohio*, 2003.

Payette, Jacqueline M., *Estimation of Sex for Humans Based on the First Metacarpal and First Metatarsal*, presented at Society for American Archaeology meetings, Philadelphia, PA, April 8, 2000.

Key Projects

For clients in telecommunications industry, Ms. Payette has led a team who have performed all aspects of cultural resources compliance for thousands of proposed telecommunications towers locations over the last eight years (1998-present).

For clients in energy industry: consultation with federal and state agencies, Federally Recognized Tribes, and local community entities; and designing approach to cultural resources compliance for large projects (1998-present).

For a large pipeline project, supervised field investigations, compiled results, performed analyses, and produced report on Phase III investigations at the Vestal Site (24Fr760), an Avonlea bison processing site in Fergus County, Montana (1998).

Pedestrian survey for cultural resources of a large pipeline right-of-way in the vicinity of Bozeman, Montana (1998).

For clients in energy industry: consultation with federal and state agencies, Federally Recognized Tribes, and local community entities; and designing approach to cultural resources compliance for large projects (1998-present).

L. Reed Huppman



Mr. Huppman is a partner and manages of ERM's Washington, D.C. office and has over 20 years experience in applied environmental sciences and consulting. He has managed and contributed to numerous interdisciplinary studies including environmental impact assessments, environmental due diligence audits for financial transactions, public consultation and assessment programs, and capacity building and training. He has developed policy and management documents and performed internal evaluation studies for international financial institutions. His project experience encompasses oil and gas development, major infrastructure projects, corridor projects including major pipelines and roads, industrial audits, forest and watershed management, coastal zone management, national environmental management planning, cleaner production and energy efficiency, and ecosystem restoration having received two awards for restoration design projects.

Mr. Huppman has served as a consultant to a number of private sector corporations seeking project financing from the Washington based multilateral and bi-lateral lenders to the private sector including IFC, IDB, IIC, OPIC, and EXIM Bank. He has consulted for multinational corporations and investment funds, the International Finance Corporation, the Private Sector Department of the Inter-American Development Bank, the Inter-American Investment Corporation, and the World Bank. Mr. Huppman has worked in over 20 countries in Latin America and the Caribbean, Eastern Europe and the former Soviet Republics, and South and Southeast Asia.

Registrations & Professional Affiliations

- American Geophysical Union
- American Water Resources Association
- Association of Wetland Scientists
- International Association of Geomorphologists
- Society for Ecological Restoration

Education

- B.S., Geology, Boston University, 1973
- M.S., Environmental Engineering, Dept. of Geography and Environmental Engineering, G.C. Whiting School of Engineering, Johns Hopkins University, 1980

Key Industry Sectors

- Infrastructure (roads and pipelines)
- Oil and gas development
- Electric power generation and distribution
- Industrial development
- Resort development
- Forestry
- Manufacturing
- Aquaculture

Honors and Awards

- Chesapeake Bay Program, Special Achievement Award for Habitat Restoration, 1994
- U.S. Army Corps of Engineers, National Honor Award for Environmental Design, 1993

Publications

The World Bank. *A guide for the preparation and review of environmental assessment reports. Middle East and North Africa Region, Rural Development, Water and Environment Department, Technical Report, 101pp.* 2000.

Huppman, L.R. and T. Braddock. *Wetlands: Ecology, Law, and the Permitting Process.* U.S. Government Institutes Press, 179pp. 1995.

Key Projects

SEA of Tourism Sector, Mexico for the World Bank, 2005. Project director for an SEA of tourism strategy for Mexico – This project involved analysis of the existing management systems for tourism development in Mexico, identifying gaps, and recommending measures to improve tourism from a sustainability perspective. In addition, case studies were carried out of two relatively undeveloped areas where tourism pressure is rapidly growing: the Costa Maya and Mar de Cortes. A preliminary GIS analysis was conducted to illustrate the constraints and opportunities in these two areas.

Case Studies of Policy Level SEAs for the World Bank, 2004 – Retained by the World Bank to identify, select and prepare case studies of policy level Strategic Environmental Assessments (SEAs) to serve as examples for World Bank staff and borrowing countries for the future preparation of SEAs for structural adjustment lending programs.

Development of an EMS for Corporación Interamericana para el Financiamiento de Infraestructura, 2005 – Contracted to develop and environmental, social and health and safety screening and management system for CIFI. CIFI is a private debt financing investment fund focused on private sector infrastructure in Latin America and the Caribbean.

2004 Annual Monitoring Report Review, Corporación Interamericana para el Financiamiento de Infraestructura, 2005 – Contracted to carry out preparation of the CIFI's annual environmental and social review of their investment projects for fiscal year 2004.

Strategic Environmental Assessment Workshop, the World Bank, 2003 – Engaged to prepare and facilitate an SEA workshop as part of the WB's Structured Learning Program on SEA. This involved review of WB's SEA

portfolio, international practice via research and interviews with key staff at the WB staff, other MFIs, and private sector firms carrying out SEAs.

Sustainable Private Equity Case Studies, IFC, 2004 – Project director for a contract for the IFC Sustainable Markets Facility to carry out a portfolio review of IFC's investments in banks, investment funds, and venture capital funds globally and to identify/prepare case studies of examples of investments in businesses demonstrating best practices in sustainable management. The case studies involved visits to the selected companies and extensive interviews with management to determine motivating factors and other drivers as well as lessons learned which could be broadly applied across the IFC portfolio.

Sustainable Investment/EHSS Assessments for the ASEAN China Investment Fund, 2004 – Project director/manager for an ADB sponsored US\$100 million investment fund focused on investments in East Asian companies and with a mandate to promote eco-efficiency and general sustainable business practices in their portfolio. The project is utilizing ERM staff in offices throughout Asia for the site visits.

EIA review for Pharmachem transaction, The Bahamas, First Caribbean International Bank/Barclays, 2003 – Equator Principles and Barclays Reputational Risk review of project environmental and health and safety documentation for a pharmaceutical plant sale/financing transaction.

EIA Review for Egypt LNG financing syndicate, Credit Lyonnaise, 2003 – Equator Principles compliance review of project environmental and health and safety documentation for a major LNG export plant.

Project Preparation for the Tobago Southwest Sewage Treatment Plant and ICZM Project, Trinidad and Tobago, Inter-American Development Bank, 2003-2004 – Project director for the preparation of a IDB Project Report and associated TORs for additional studies for a \$70 million loan to the government of Trinidad and Tobago to fund an Integrated Coastal Zone Management project wrapped around a \$65 million sewage treatment plant on Tobago.

Pre-Privatization Due Diligence and Water Resource Management Assessment, St Lucia, the World Bank, 2003-2004 – Project director for a environmental and due

diligence assessment and sustainable water resource management assessment for the water and sewerage company of St Lucia.

Annual Monitoring Report Review, Corporación Interamericana para el Financiamiento de Infraestructura, 2003 – Contracted to carry out preparation of the CIFI's annual environmental and social review of their investment projects. CIFI is a private debt financing investment fund focused on private sector infrastructure in Latin America and the Caribbean.

Due Diligence Audits for Aqua International Limited Partners, 1996 – ongoing – Mr. Huppman is project director and manager for an international private investment fund specializing in the water sector. Aqua is an OPIC investment fund and adheres to OPIC and World Bank guidelines for environmental and social issues related to projects. Mr. Huppman has managed environmental, social and occupational health and safety due diligence audits for a number of potential investments including three provincial water utilities in Argentina and bottled water companies in India, Tajikistan, Israel, Poland, and Russia, and breweries in Russia, and a major Mexican manufacturer of water tanks and related products with plants in 8 countries in Latin America.

Strengthening Environmental Monitoring and Enforcement, NIMOS, Suriname, 2003 – Project director for an IDB funded institutional capacity building project for the national environmental agency of Suriname, NIMOS, focused on environmental monitoring and enforcement policy and operations.

Annual Monitoring Report Review, IFC, 2003 – Contracted to carry out review of over 70 annual reports submitted by IFC client companies. These were primarily financial intermediary clients.

Environmental and Social Due Diligence Audit for Bandeirante, Sao Paulo State, Brazil, for the Inter-American Development Bank Private Sector Department, 2003 – Project director for an environmental and social due diligence audit of a recently privatized urban electric distribution company in the Alto Tiete district of Sao Paulo State which is seeking a capital expansion loan from the IDB Private Sector Department.

Revision of Policy and Procedures for the InterAmerican Investment Corporation, 2002 – Engaged by the IIC to revise and update their environmental and workplace

policy and procedures on the basis of trends among peer international private sector financing institutions and the realities of the IIC's operating region and the target market.

EIA for a gas pipeline project in Baja Mexico for a confidential client, 2002 – Joined the international EA project team midstream at the request of the project manager to improve the technical and site specific aspects of the assessment, in particular in the areas of terrestrial and river crossing impacts and reinstatement measures relevant in the context of the semi-arid environment.

HSE Advisor for project financing acquisition, Pluspetrol, Peru, 2002 – Engaged as a consultant to assist Pluspetrol during the due diligence process related to the acquisition of project financing from EXIM Bank and Inter-American Development Bank.

Clean Technologies and Energy Efficiency Pilot for International Finance Corporation, 2001-2002 – Project director for a clean technologies and energy efficiency investment project which will identify, design and implement projects among IFC's current portfolio in Latin America. Contracting will be based on performance contracts, and IFC will provide financing through their network of financial intermediaries in the region. The project will serve as a pilot for subsequent projects in other Eastern Europe and South and East Asia.

HSE Advisor for Cap Ex funding acquisition, Transredes Corporation, Bolivia, 2001-2002 – Engaged as a consultant to assist Transredes, the privatized Bolivian gas and oil pipeline company, in the acquisition of CapEx financing from a consortium led by the Inter-American Development Bank, Private Sector Department. This involved review and preparation various summaries of the corporation's HSE policies, systems, and procedures for the due diligence process.

Preparation of Guidelines for Environmental, Social and Health and Safety Management Plans for Infrastructure Projects, the Inter-American Development Bank, Private Sector Department, 2001 – Project director for the preparation of a series of reporting guidelines and sector issue guidelines which the IDB will use to identify risks and supply to prospective borrowers to clarify issues and improve the quality of information submitted during the due diligence process. The project will

produce 8 reporting guidelines and sector issues for 11 sectors.

Regional Safeguards Environmental Quality Enhancement Program, Middle East North Africa Region, World Bank, 2001 – Project director for a desk study of 37 selected MNA regional safeguard risk projects. The review consists of collecting all existing project documents and reviewing for each project the most recent summaries of the Quality Assurance Group. The World Bank's Integrated Safeguard Datasheet (ISDS) was then used to prepare a checklist of safeguard risks. Based on the review and checklist assessment, a summary of the findings and recommendations was prepared and delivered in a workshop for MNA safeguard policy staff.

Environmental and Social Due Diligence Audit for DEORSA-DEOCSA in Guatemala, for the InterAmerican Development Bank Private Sector Department, 2001 – Project director for an audit of a recently privatized rural electric distribution company in Guatemala which is seeking a capital expansion loan from the IDB Private Sector Department.

EA for the Romanian Forest Development Project, the World Bank, 2001 – Project manager for an EA of the Romanian Forest Development Project, a comprehensive forest sector reform project. Key issues included sector wide legal, institutional, and regulatory capacity and specific EA and environmental management capacity for design and development of forest road networks.

Environment Department Secondment, International Finance Corporation, 2001 – Seconded on a part time basis to the IFC Environment Department for six months to carry out project reviews, appraisal missions, and supervision for the agri-business, hotel and tourism, and forestry unit. Projects appraised included sustainable forestry in Argentina, shrimp aquaculture in Ecuador, major commercial real estate development in the Philippines, and hotel and resort developments in the Honduras, the Maldives, and Grenada.

Environmental and Social Monitoring and Supervision, Energia Norte Project, Brazil, for Guascor and the InterAmerican Development Bank, 2001-2005 – Project director for a multi-year supervision contract for an IDB Private Sector Department project. Energia Norte provides electric power from diesel generators in 81 rural locations in the Amazonian states of Acre, Rondonia, and Pará, Brazil. Supervision involves site

visits and review of documentation and environmental management systems in terms of IDB policies and guidelines and project specific requirements. ERM is responsible for issuing certificates of compliance on the basis of the monitoring; these certificates represent pre-conditions for specific loan disbursements.

Evaluation of Application World Bank Emission Guidelines to Biomass Combustion in the Oil Palm Industry, International Finance Corporation, 2001 – Project manager for a study to examine the relevance of World Bank Group general emission guidelines with respect to the realities, including health and environmental effects and cost/benefits of control technologies, in the oil palm processing industry. The study focused on recommending process improvement investments which would lead to lower emissions as opposed to end of pipe solutions.

Environmental Compliance Assessment for Current Corporate Finance Projects, Inter-American Investment Corporation, 2000 – Project director for a review of direct investment projects in the IIC portfolio. The project involved study of projects in multiple sectors, including agro-processing, power generation, and manufacturing, through review of initial project documents and annual supervision and monitoring reports. A short list of 10 projects with the highest potential environmental risk, in terms of national and IIC policies and guidelines, was developed and site visits carried out to determine field conditions. Output of the site visits included recommendations for corrective actions as well as assessing specific opportunities for pollution prevention/cleaner production/energy efficiency measures. The final report included recommendations for improving IIC environmental management policies and procedures and operations.

Establishment of an Environmental, Institutional and Regulatory Framework Applicable to Electricity Sector Operations, Guyana, Inter-American Development Bank, 2000 – Project manager for an institutional strengthening project working with the recently established Environmental Protection Agency of Guyana to develop environmental management capacity and regulations for the newly privatized electricity sector.

Environmental Assessment and Remedial Action Plan for the Impacts of the Carretera Cuenca-Molleturo-Emplame, Ecuador, Inter-American Development Bank, 1999-2000 – Project manager for assessment and development of a

comprehensive action plan for impacts resulting from the construction of the Carretera Cuenca-Molleturo-Empalme in the Andes of Ecuador. Mr. Huppman worked with a team of local civil, geotechnical and hydraulic engineers to assess and prioritize the problems and develop a comprehensive U.S. \$5.8 million program for emergency works and long term management solutions. This included civil engineering works to control flooding in the coastal plain, measures for managing the potential impacts of the road, including accidents involving hazardous material cargo, on a high mountain national park which is the water supply for the third largest city in Ecuador, and a large scale slope stabilization program employing indigenous rural residents through local non-governmental organizations. The IDB began implementation of the program in fall 2000.

Environmental Due Diligence Consulting for a Major Natural Gas Company Capital Expansion Program in Bolivia, Transredes Corporation, 1999-2000 – Engaged as a key advisor to Transredes for environmental due diligence requirement negotiations associated with the acquisition of multilateral institutional funding from OPIC, IDB and EXIM Bank. This included an international stakeholder consultation exercise to inform major NGOs of the nature and objective of the project and how Transredes would manage environmental and social issues and impacts.

Guide for Preparation and Review of EA Reports, Middle East and North Africa Region, World Bank, 1999 – Project manager and principal author for the development and preparation of a guide for the commissioning and review of environmental assessments according to World Bank policies and guidelines. The manual was designed to provide practical guidance to non-specialists for the review of EAs for Category A and B projects. Intended to build capacity in this area among the national agencies in the MNA region countries and to assist Bank task managers as well, the focus was on the identification of the key environmental and social issues in the sectors in which the Bank is most active in the region (e.g., power, water and sanitation, solid waste management, irrigation) and to provide a checklist for evaluation of the adequacy of the EA in proposing solutions to the problems. The guide has been translated into Arabic and French and was published in spring 2000 as a World Bank Technical Paper.

Pescada-Arabaiana Offshore Platform Due Diligence for a Confidential Client, 1999 – Project director for the preparation of an audit of an offshore oil and gas development and pipeline in northeastern Brazil. The audit and ancillary documents, including an oil spill contingency plan, health and safety plan and environmental management plan were intended to meet U.S. Overseas Private Investment Corporation requirements.

Environmental Management in the Financial Sector Training Course, Inter-American Investment Corporation, 1999 – Mr. Huppman was project director and manager for development of a training course in environmental risk management for IIC's financial intermediaries clients (i.e., commercial banks, fund managers and venture capitalists) in Latin America and the Caribbean. The course was designed to build capacity for environmental risk management among the IIC's private sector borrowers and investment partners as well as demonstrate competitive advantage opportunities which are available through environmentally sound investments (e.g., cleaner production, pollution prevention and energy efficiency). The pilot course was delivered in Miami in June 1999 to 17 Latin American financial institutions. The course has subsequently been delivered to IIC's entire internal staff and to another 60 financial institutions throughout Latin America.

EIA Training for National Government Staff in 14 Latin American Countries, the Inter-American Development Bank, 1999 – Part of an international ERM team that developed an EIA training and capacity building course on behalf of the IDB. He also delivered the course in Jamaica, Trinidad and Belize in conjunction with specialists from the IDB. The course consisted of a series of training modules, group exercises and case studies from the IDB portfolio selected specifically for each country to ensure relevance.

Environmental Due Diligence Audit of Sugar Farm and Mill in Peru, for the IIC, 1999 – Project director for an environmental due diligence audit of a recently privatized sugar mill in Peru in which the IIC is considering making an investment. The project involved a site visit, consultations with management and preparation of a report, which included a corrective action plan involving cleaner production and pollution prevention measures and cost estimates for the necessary works.

Western Region Integrated Project for Unocal Corporation, 1997-1998 – Project manager for the Environmental Assessment of Unocal’s gas field and power development project in the coastal regions of southwestern Bangladesh. This U.S. \$750 million project involved development of proven gas reserves on the island of Bhola, construction of a 150 km transport and distribution pipeline, and construction of a gas processing plant and three power plants generating a total of 330 megawatts of power. The project's scope required detailed analysis of coastal and inland environmental issues including fisheries, agricultural practices, cyclones, seismic uplift and settling, biodiversity, water quality and resources, air quality, and construction impacts. The length of the pipeline and the siting of the five facilities required extensive and innovative public consultation exercises, assessment of construction and operational impacts and environmental management practices, and independent emission and water resource impact analyses for each of the three power plants.

Environmental Management for Financial Intermediary Program, International Finance Corporation, 1997 - 1998 – Seconded to the IFC Environment Department. Working primarily with investment officers and financial intermediaries such as commercial banks, fund managers and venture capitalists, was responsible for reviewing the environmental issues associated with their portfolios and providing strategy, guidance and training on environmental appraisal and risk management. Also managed the environmental aspects for a number of investment assessment reports (IARs), IFC’s internal ex-post evaluation process for financial institutions in Colombia, Mexico, and Costa Rica, and carried out supervision missions in Costa Rica where he visited banks and the sub-projects which received funds under the IFC loan.

Pirapama River Basin Management Project, Brazil, UK DFID, 1997-1998 – Environmental Management Specialist for this technical assistance project which assisted national and local Brazilian resource management agencies to enhance institutional capacity for river basin and water resource management and to collaborate in the preparation and implementation of a Sustainable Development Plan for the basin. He focused primarily on non-point source measures for sugar cane plantations and cleaner production technologies for industries discharging wastewater to the basin.

National Environmental Action Plan II for Mauritius, the World Bank, 1998 – Mr. Huppman served as Team Leader for the development of the second NEAP for Mauritius.

Environmental Sourcebook Update, Public Consultation, the World Bank, 1997 – Managed the preparation of a World Bank Environmental Sourcebook update on the Public Consultation process in Environmental Assessments. This involved examining a number of bank projects for illustrative examples of both good and bad practice and to highlight key issues and strategies for successful consultation.

Brian C. Winsor



Mr. Winsor is a Safety & Health Consultant within ERM, based in Hartford, CT. Brian is a degreed safety professional with experience in implementing and managing safety & health programs in manufacturing operations. Prior to joining ERM in August 2005, Mr. Winsor worked for four years as a Health & Safety Manager for two plastics manufacturing facilities. As an H&S manager, Brian has developed, implemented and managed a number of programs on a wide variety of topics, including:

- H&S Audits and Inspections
- Development/Implementation of H&S Programs, Policies and Procedures
- Job Hazard Analysis/Safe Work Practices
- H&S Training
- Accident/Incident Investigation
- First Aid/Injury Management
- Bloodborne Pathogens Exposure Control
- Emergency Action Plans
- Hazard Communication
- Lab Safety/Chemical Hygiene
- Personal Protective Equipment
- Industrial Hygiene
- Control of Hazardous Energy (Lockout/Tagout)
- Respiratory Protection
- Behavior-Based Safety
- Powered Industrial Trucks
- Ergonomics
- Machine Guarding
- Worker's Compensation

Registrations & Professional Affiliations

- American Society of Safety Engineers

Education

- B.S. Occupational Safety Studies, Keene State College, 2001
- OSHA 501 General Industry Outreach Training

Fields of Competence

- Organization & administration of health & safety programs
- H&S Compliance
- H&S Auditing
- Hazard analysis and control
- Safety management systems
- Competence & training

Key Projects

Audit for Confidential Aerospace Components

Manufacturer - Performed a week-long, comprehensive audit of manufacturing operations to identify key health and safety issues, identify potential OSHA violations and assist in the resolution of existing OSHA violations (e.g. identify similar issues to avoid willful/repeat violations).

Audit for Confidential Plastic Resin Manufacturer -

Performed an audit of a plastic resin manufacturing facility to identify key health and safety issues as part of a due diligence project. The purpose of this audit was to identify and report on any major health & safety liabilities prior to the sale of the facility.

Audit for Confidential Automobile Parts

Manufacturer- Performed an audit of two automotive manufacturing plants to identify key health and safety issues as part of a due diligence and environmental health & safety compliance project. The purpose of this audit was to identify and report on any major health & safety liabilities prior to the sale of the facility, as well as auditing the plants for compliance to applicable regulatory standards (OSHA, etc.).

Safety & Health Program and Training Development for Confidential Extruded Wire Manufacturer -

Worked with other ERM consultants to develop, implement and provide training support for a number of safety & health programs, including Ergonomics, Powered Industrial Trucks, Lockout/Tagout and Hazard Communication.

Lead Exposure Monitoring, Confidential Automotive

Parts Manufacturer - Performed airborne lead exposure monitoring for an automotive parts manufacturer to supplement a due diligence report for sale of the facility. The objective was to collect 8-hour air samples, using personal sampling pumps, to determine the airborne lead exposure of employees working with lead solder and compare the results to OSHA permissible exposure limits.

Industrial Hygiene Sampling, Confidential

Manufacturing Company - Assisted with industrial hygiene sampling on a building the client was looking to purchase, which had once housed an operation that had used hazardous chemicals. The company wanted to ensure that the past use of these chemicals did not pose a hazard to their employees. Specifically, Mr. Winsor performed air and surface-wipe sampling to verify that the remnants of the particular chemicals of concern were below established levels of concern.

Kevin Kinsella



Mr. Kinsella is an experienced HSE Consultant and Partner within ERM based in the UK.

Mr. Kinsella has broad Safety, Risk and Reliability experience primarily in the Oil & Gas Industry and has carried out major projects in both the UK and Middle East. He has completed detailed risk assessments both onshore and offshore assisting with both new projects and operational facilities. He has specific experience of LNG plant risk assessment and was involved in many of the large scale investigations into LNG safety carried out by British Gas in the 1980's. Mr. Kinsella previously headed AEA Technology's Oil & Gas Safety Business before joining ERM in 2004.

Fields of Competence

- Quantified Risk Assessment (QRA)
- Corporate Risk Profiling
- Business Risk Assessment
- Hazard Identification
- Consequence modelling (Fire, explosion, gas dispersion)
- Business Continuity Assessment
- Land Use planning advice
- Due Diligence Reviews (Safety and Technical Risk)

Key Industry Sectors

- Oil & Gas
- Process Industries (Pharm/Chem)

Education

- BSc (Hons) Applied Physics, 1980
- CPhys, MInstP
- Member Safety and Reliability Society
- Member European Work Group on QRA

Key Projects

Dolphin Energy. Project Director for a 3 yr call-off contract to supply HSE services to a major project in the Middle East. The project comprises new offshore gas platforms, gas processing plant at Ras Laffan in Qatar, subsea pipelines and a gas reception terminal in Abu Dhabi. Initial work completed by AEA includes a risk assessment and Flare study for the Taweelah Gas Reception terminal.

Encana Buzzard Project. Project Director for the offshore Buzzard Project, QRA and Safety Case studies. The new offshore facility is the largest current offshore project in the UK.

ExxonMobil, South Hook Terminal. Project Director for the 'COMAH' submission pre-construction safety report (PCSR) for the South Hook Terminal LNG Project.

BHP Petroleum. Project Director for the development of an Electronic Safety Case ('E'-Safety Case) for BHP Petroleum's Point of Ayr Gas Terminal in UK.

Royal Bank of Scotland. Project Director for a Technical HSE Due diligence review of two gas plant acquisitions. The review examined all HSE compliance issues and identified key risks. The study also involved witnessing company activities on site assessment.

Totalfinaelf Qatar. Project Director for Quantitative Risk Analysis of Elf Petroleum production facilities project on Halul Island. Detailed assessment of fire and explosion hazards resulting in recommendations for improved risk control measures.

BP. Project Director for detailed explosion analysis of two BP North Sea platforms using AutoReagas. The work involved assessing blast overpressure and reviewing explosion mitigation measures for the platforms in line with the installations safety case.

ExxonMobil. Project Director for detailed explosion modelling for the Orlan offshore platform in Canada. The work involved assessing explosion overpressures using the AutoReagas CFD code for several platform areas

Qatar Petroleum. Project Director for series of detailed Quantified Risk Assessments addressing both offshore production/ drilling and onshore refining and processing. The studies involved extensive analysis of fire, explosion and toxic hazards. The QRAs have been used as the basis for developing risk reduction plans and supporting management systems.

Kerr McGee. Project Director for a review of Explosion Hazards for Janice offshore platform and development of performance standards for structures. Explosion analysis using the BG CHAOS software package. Responsibility for all blast analysis from initial concept, through detailed design to operation.

BP Cleeton. Review of Explosion Hazards on BP's Cleeton Platform. Assessment of explosion risk and

identification of remedial measures (venting and structural enhancements). This was an extensive study which involved a 5 month secondment to the Design Contractor's offices in Aberdeen.

Joint Industry Project. Offshore ignition modelling; joint industry project to develop an ignition model for use in offshore QRA explosion assessment.

Marine Technology Directorate. Preparation of AEAT's technical contributions on explosions to a detailed technical guide covering all aspects of offshore QRA.

Joint Industry Project. Study of offshore probabilistic explosion analysis involving a review of the latest techniques, models and data. Project involved five major Offshore Operators. Study was performed as an integral part of a joint industry project on offshore explosion QRA.

BHP Petroleum. Peer Review of all Safety Case documents for the Liverpool Bay development prior to submission to regulator. Review covered installation description, safety management system description, fire and explosion hazard assessment (including QRA) and assessment of safeguards.

Amoco (UK). Review of the latest technical developments in offshore fire and blast analysis. The review covered an assessment of all the latest offshore explosion experiments and a review of the effectiveness of existing explosion prediction models including FLACS, AutoReagas, CHAOS and EXSIM.

European Safety & Reliability Association. Study of use of offshore QRA in different European Countries identifying common problems and highlighting the benefits of different approaches.

BHP Petroleum. Project manager and Lead Consultant for the preparation of three offshore safety cases for North Sea Installations. The project involved performing; detailed QRA; fire and explosion analysis; escape, evacuation and rescue analysis; TR impairment analysis and systems vulnerability analysis. Responsibilities included leading the project team, liaising with the client and making presentations to the UK Health & Safety Executive.

British Gas. Performance of a cost-benefit analysis for the installation of sub-sea isolation valves including an

evaluation of the comparative risk to personnel, assets and production.

Organisation and Presentation of a series of one-day seminars on QRA and cost-benefit analysis to offshore operators in the UK and Netherlands. The presentations and follow up meetings resulted in over £1m of work for offshore safety cases and the establishment of an AEAT office in The Hague.

Texaco North Sea. Project Manager and Lead Consultant for the performance of a detailed study of fire, explosion, structural response, and escalation within a wellheads module and separation module of a large Northern North Sea Oil & Gas installation. The project involved the identification of hazards within the modules, the calculation of initiating event frequencies, the evaluation of time dependent fire and blast consequences using CHAOS, the calculations of subsequent structural response and escalation, and the identification of risk reduction measures.

Chevron Project Manager and Lead Engineer for the performance of a detailed escalation analysis for three Northern North Sea installations. The analysis involved modelling fire and explosion events in terms of consequences, probability and timing of escalation and predicting the frequency of the TR impairment.

Hamilton Oil. Lead Consultant for a study of risk levels in the UK offshore industry and other UK industries and their relative comparison. The study was to enable the client to make judgements on suitable high level performance standards for risk.

British Gas. Project Manager and Lead Consultant for a full QRA of a major UK Gas Reception terminal. The project involved the performance of HAZOPs, the evaluation of event frequencies and consequences (explosion and fire), and the calculation of risk to both workers (individual risk) and surrounding population (individual risk contours and societal risk calculation). Key risks were identified and appropriate risk reduction solutions proposed.

British Gas. Risk Assessment for a high pressure gas transmission pipeline including the modelling of explosion and fire hazards.

Amoco (UK). Project Manager and Lead Consultant for several fire and blast studies for offshore installations. The studies involved evaluating the size and severity of potential fire and explosion events including the calculation of thermal flux levels, explosion overpressures and structural damage.

Shell Expro. Project Manager and Lead Consultant for the development of a methodology for determining HVAC requirements to prevent combustible mixtures arising from fugitive emissions in offshore modules. The study was extended to incorporate the method into the clients HVAC Code of Practice in relation to the control of explosion risk.

Project Manager and Lead Engineer for study of pool fire heat flux calculations supplied for Phase 1 of the SCI's joint industry project on offshore fire and explosion.

DTI. Lead Consultant for a detailed study of potential explosion severity and structural consequences for petroleum and liquid gas spills in UK road and rail tunnels. The work involved evaluating the potential damage and risk to existing tunnels and the blast resistance of a new tunnel design.

Halliburton. Project Manager and Lead Consultant for a full Quantitative Risk Analysis of a high explosive storage site containing offshore explosive cutting charges. The project involved evaluating the likelihood of a major incident at the site and the potential consequences to workers in the main office building and surrounding factories.

The results of the study were used to make judgements on the maximum amount of explosive to be stored on the site and the optimum storage location.

Project Manager and Lead Consultant for the development of AEAT's fire and explosion models for Oil & Gas installations (PFIRE and EXPEL).

Lead Engineer for a variety of projects assessing the effects of dynamic impacts on steel and concrete structures (explosions, ship impact, etc).

Jeffrey A. Simmerman, LCDR USCG (ret)



Mr. Simmerman, serving as senior supervisor in the USCG, performed inspection audits for over 120 facilities and refineries annually, and was the final regulatory reviewer of all facility operations related to emergency, security and OPA 90 response contingency plans. During Mr. Simmerman's career, he has developed several Area and Local Emergency Response Contingency Plans. He was Federal On-Scene Coordinator for numerous major marine oil and chemical fire-fighting and spill responses, and has coordinated significant post-spill environmental quality assessments. He also has experience as a Senior Security and Safety Program Manager regulating all marine safety facility and vessel activities in a 26 state region.

Additionally, Mr. Simmerman is a Senior Vessel Surveyor and highly qualified commercial vessel inspector. He has nine years experience examining safety appliances on pressure vessels, steering gear, and auxiliary machinery and has performed drydock examinations for both vessels and Mobile Offshore Drilling Units (MODU).

Twenty two years of federal law enforcement and port security/military experience with the U. S. Coast Guard, and approximately four years of private consulting experience. Mr. Simmerman has directed or personally conducted numerous Security Vulnerability Assessments (SVA) and Security Contingency Plans for diverse types of facilities, vessels, and offshore production platforms. Activities included the development of security vulnerability mitigation protocols, MARSEC security training, and third party security audits.

As a result of Mr. Simmerman's extensive background in security and marine-related matters, he is also

experienced with litigation support and expert testimony.

Registrations & Professional Affiliations

- Certified Infrastructure Preparedness Specialist (CIPS) number 01773, OIP, Department of Homeland Security
- USCG Flight Officer/Engineer AIC designation number 110-120
- Anti-Terrorism Task Force in Middle District Louisiana

Louisiana Emergency Preparedness Association
Baton Rouge Area Mutual Aid Society (BRAMAS)

Fields of Competence

- Federal On Scene Coordination (FOSC) hazmat and oil spill response activities
- OPA 90 oil spill contingency plans
- Certificates of Adequacy for facilities and vessels
- U. S. Coast Guard compliance Issues
- Army Corps of Engineers wetland permits
- Hurricane contingency plans
- Security Vulnerability Assessments (SVA) for facilities, vessels and offshore production platforms
- U.S. Coast Guard MARSEC security plans
- DOT/RSPA-mandated security plans 49 CFR 172
- IMO SOLAS/ISPS Code vulnerability studies and facility/vessel security plans

Education

- B.A. History, Auburn University (1980)
- Port Operations USCG RTC Yorktown, VA (1992)
- Seaport Security/Antiterrorism, Federal Law Enforcement Training Center, Glyco, GA. (1992)

- OSHA Safety and Occupational Health Coordinator USCG Training Center Yorktown VA. (1995)
- Marine Surveyor and Inspector USCG Training Center Yorktown, VA (1992)

Publications

“Inlet Protection Strategies in the Coastal Zone” International Coastal Zone Proceedings, Tampa, FL 1997.

“All’s Well That Ends Welded” Marine Safety Proceedings, Spring 1998.

“ICS; A Planners Vision; A Responders Dream” International Oil Spill Conference Proceedings Long Beach, CA 1993.

“OPA 90: An Industry Impact “ American Society of Engineers Compendium; Savannah Chapter, GA 1993.

“Total Quality Management (TQM) comes to the Academy” U.S. Coast Guard Academy Newspaper New London, CN September 15, 1994.

“Maritime Security during the XXVIth Olympiad” National Security Symposium Proceedings, Arlington, VA 1997.

“Security Contingency Plans; Predicaments, Problems, and Pitfalls” Business & Industry Alliance, Houston, TX September 2005.

Key Projects

Mr. Simmerman, as Federal On-Scene Coordinator representative and ICS responder, coordinated the following CERCLA and OPA 90 spill response efforts:

Chemical refinery, 9 million gallon, sulfate turpentine, marsh fire and chemical spill response. Mr. Simmerman mobilized significant specialized fire and spill response personnel and equipment. Evaluated hazard and began coordinated effort and evacuation of 2000 Savannah GA residents from homes based on hazmat risk analysis. As Planning Section Chief in Incident Command System (ICS), coordinated the response efforts of 1000

responders from 51 different government agencies and marine industries.

Tank barge tow, 4 million gallon, unleaded gasoline, fire and spill response. In a remote location of South Louisiana as first responder and Federal On-Scene Coordinator, Mr. Simmerman coordinated the fire fighting and response activities of 240 personnel, on 4 vessels and with nearly \$1 million of fire suppression equipment. This response was successfully completed with no loss of life or injuries, and minimal environmental impact in less than 4 days. Superb stability analysis and judgement prevented 4 heavily damaged tank barges from sinking.

Assigned to coordinate Port Safety and Security policy issues for the largest Marine Safety Division in the Coast Guard for the Eighth District Commander. Provided policy oversight over a variety of waterways management issues for 27 field offices across 26 states including six large passenger terminals in 3 of the 5 busiest ports in the country. Key data collection and liaison allowed 100% compliance to new passenger and terminal security regulations enacted after 9/11 terrorist attacks.

Managed marine inspection activities of the largest inspected fleet and largest Outer Continental Shelf branch in the U.S. Ensured vessel and industry compliance of 1370 vessels and 1900+ Outer Continental Shelf rigs and platforms with maritime law and regulations.

Formulated much of the contingency planning for the 1996 Olympics sailing venues near Savannah. Coordinated the activities of 7 USCG units and 14 agencies for over 400 security personnel. Internationally visible response operations conducted in accordance with plan over a two-week period of 1996 Olympics without response or security breaches at venues or at Olympic village along the water. Units involved in operation also received commendations.

Provided expert testimony before both the State Senate Transportation Subcommittee and the joint State of Louisiana Legislature on maritime safety and oil spill

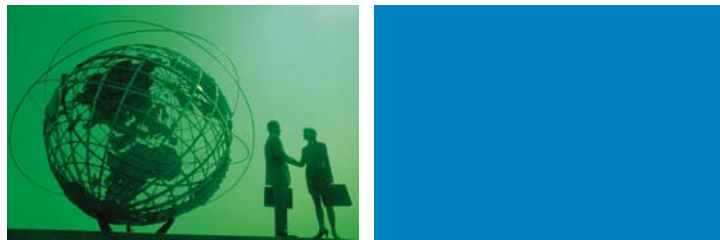
response operations impacting the state. In a media intensive environment, Mr. Simmerman's testimony brought heightened awareness to legislators. Legislators later enacted laws that changed and substantially improved state safety and operational requirements on these maritime industries utilizing the river. Joint State Legislature voted an individual proclamation, signed by House Speaker and Senate President recognizing Mr. Simmerman's effort and expertise.

Mr. Simmerman as Marine Safety and Waterways Division Head coordinated with 27 field offices in 26 states to implement several heightened unit force protection and marine safety policies designed to protect oil and refinery facilities along District 8 Waterways. Provided the regulatory oversight, oil spill and hazmat response and port security of 125 waterfront hazmat facilities for 340 miles of the Mississippi River. Utilized marine safety law enforcement databases to evaluate and mitigate port safety risks of 850+ deep draft foreign vessel arrivals annually in fifth largest port in the country.

Mr. Simmerman coordinated U.S. Attorney's joint Task Force and Local Emergency Planning Committees joint planning operations. Operations included conducting security response, biohazard and pollution response exercises and drills. Activities dramatically improved port and vessel safety and security after 9/11. As Safety and Occupational Health Coordinator, managed second largest safety program for USCG including training budget and safety equipment supply for 100+ USCG hazmat responders. Mitigated hazards and risk to one of the operationally busiest MSOs in the country through an innovative system that included a comprehensive crew training program, personal safety equipment provisions, and top-to-bottom safe work practices review. Safety program received highest marks possible during external compliance audit by USCG regional inspection team.

Since 9/11 terrorist incidents, Mr. Simmerman has conducted over 200 Security and Safety Assessments (SSA) for various facilities, vessels, and offshore oil platforms. Mr. Simmerman conducted a wide range of SSAs for: nuclear and fossil energy power plants; large refineries; shipyards; offshore fabrication facilities; vessel and towing companies; barge operators; high-density passenger vessels; and gaming casino boats. Directed one of the largest regulatory vessel inspection programs in the country which included 800 vessel inspections annually. Inspected fleet included: seven large high density passenger vessels (all with capacities over 1000 passengers) regulated under 46 CFR subchapter H; 8 state-operated passenger ferries, vessels, and barges, and numerous 46 CFR subchapter T regulated small passenger vessels and crewboats. Provided key expert witness testimony identifying substantial spill responder negligence in accordance with maritime regulations and National Contingency Plan. Provided noteworthy support to confidential client law firm in discovery deposition phase that established client defense and allowing client attorneys to win judgement. Result: plaintiff dropped multimillion dollar lawsuit.

Maureen C. Leahy



Dr. Leahy has more than 23 years of experience in chemistry, biochemistry and environmental remediation technologies and has served clients in over 30 States in the USA, Canada, Latin America, Europe, and Asia Pacific. Dr. Leahy provides technical support in the application of biological, chemical, and physical treatments for contaminated soil and groundwater. Dr. Leahy has conducted feasibility studies, designed pilot tests and provided oversight for multiple projects involving aerobic and anaerobic bioremediation, soil vapor extraction, air sparging, dual phase extraction, chemical oxidation/reduction, natural attenuation and other technologies. Dr. Leahy also provides expertise in metal chemistry and has served as QA officer responsible for data quality.

Dr. Leahy has served as an expert witness in the field of bioremediation and fate of chemicals in the environment, as well as a consultant for litigation support in the areas of petroleum fingerprint identification, natural attenuation, chemical forensics, chemical processes, remediation technology selection, and the fate of petroleum and chlorinated hydrocarbons in the environment.

Dr. Leahy has also directed laboratory support services for the remediation of contaminated soil and ground water. Her responsibilities included design of lab treatability studies, supervision of laboratory personnel, and data quality review (QA/QC). In addition, Dr. Leahy served as project manager for several government-sponsored research projects for the development of technology for the biodegradation of hazardous substances including chlorinated solvents, petroleum hydrocarbons, and coal tar.

Fields of Competence

- Anaerobic and aerobic biological remediation
- Natural attenuation evaluations
- Environmental chemistry
- Feasibility studies and technology selection

Education

- Ph.D. Molecular Biophysics and Biochemistry, Yale University, USA
- M. Phil. Molecular Biophysics and Biochemistry, Yale University, USA
- B.S. Chemistry, Fordham University, USA

Publications

Leahy, M. C., R. Hines, and R. Brown. 2005. The Role of Degradation Processes in Natural Attenuation of Chlorinated Solvents. SETAC, Baltimore, MD.

Ram, N. M., M. Leahy, E. Carey, and J. Cawley. 1999. Environmental Sleuth at Work: A Combination of Technical Approaches and Forensic Tools Can Determine Historic Cause, Timing and Impacts of Site Contamination. Environ. Sci. Technol. 4(11):464-469A.

Brown, R., M. C. Leahy and B. Molnaa. 1999. Bioremediation: A Powerful and Resilient Co-Treatment Technology. Pollution Engineering 31(10):26-29.

Brown, R. A., M.C. Leahy, and R. Z. Pyrih. 1998. In Situ Remediation of Metals Comes of Age. Remediation: The Journal of Environmental Cleanup Costs, Technologies & Techniques, Summer, pp. 81-96.

Leahy, M. C. and G. J. Skladany. 1998. Assessment of Intrinsic Biodegradation of Multiple Chlorinated Hydrocarbons. Battelle Symposium on Chlorinated Organics, Monterey, CA, May.

Leahy, M. C. 1997. Intrinsic Bioremediation as a Tool for Contaminant Control. NERM '97. The 27th Northeast Regional Meeting of the American Chemical Society, June 22-25, Saratoga Springs, NY.

Brown, R. A., C. Nelson and M. Leahy. 1997. Combining Oxidation and Bioremediation for the Treatment of Recalcitrant Organics. In: *In Situ and On-Site Bioremediation, Volume 4*. (B. C. Alleman and A. Leeson), Battelle Press, Columbus, OH, pp. 457-462.

Leahy, M. C., C. H. Nelson, A. M. Fiorentine and R. J. Schmitz. 1997. Ozonation as a Polish Technology for *In Situ* Bioremediation. In: *In Situ and On-Site Bioremediation, Volume 3*, (B. C. Alleman and A. Leeson, eds.), Battelle Press, Columbus, OH, pp. 479-483.

Leahy, M. C., B. W. Ahrens, T. L. Blazicek and G. B. Maybach. 1997. Bioreactor Treatment Comparison for Groundwater at a Former MGP Facility. In: *In Situ and On-Site Bioremediation, Volume 3*, (B. C. Alleman and A. Leeson, eds.), Battelle Press, Columbus, OH, pp. 463-467.

Leahy, M. C., A. M. Fiorentine and R. J. Schmitz. 1997. Biosparging for *In Situ* Treatment of Manufactured Gas Plant Residuals. In: *In Situ and On-Site Bioremediation, Volume 3*, (B. C. Alleman and A. Leeson), Battelle Press, Columbus, OH, pp. 445-450.

Rouse, J. V., M. C. Leahy and R. A. Brown. 1996. A Geochemical Way to Keep Metals at Bay. *Environmental Engineering World*. May/June.

Leahy, M.C. and G. Erickson. 1995. Bioventing Reduces Soil Cleanup Costs. *Hydrocarbon Processing* 74(8):63-66.

Leahy, M.C., R. A. Brown and D. Cacciatore. 1995. Complications in the Analysis of Performance During the Biodegradation of Complex Compounds in Soil. Presented at Air & Waste Management Assoc. June 20-23. San Antonio, TX.

Brown, R.A., P.M. Hicks, R.J. Hicks and M.C. Leahy. 1995. Post Remediation Bioremediation. In: *Intrinsic Bioremediation*. (Hinchee, R.E., J.T. Wilson and D.C. Downey, eds.). Battelle Press, Columbus, Ohio, pp. 77-84.

Leahy, M.C., W.C. Leonard and R.A. Brown, April 24-27, 1995. Air Sparging for *In Situ* Bioremediation of Toluene. In: *In Situ Aeration: Air Sparging, Bioventing and Related Remediation Processes*, (R.E. Hinchee, R.N. Miller and P.C.

Johnson, eds.) Battelle Press, Columbus, Ohio, pp. 185-190.

Leahy, M.C., and R.A. Brown. 1994. Bioremediation: Optimizing Results. *Chem. Eng.* 101(4):108-116.

Ram, N.M., D. Bass, R. Falotico, and M. Leahy. 1993. Decision Framework for Remediation at Hydrocarbon Contaminated Sites. *J. Soil Contamination* 2(2):167-189.

Fogel, S., M. C. Leahy, M. Jones, and R. Butts. 1990. Bioremediation of A No. 6 Fuel Oil Spill: Comparison of Laboratory Treatability Data with Field Remediation Data. 5th Petroleum Contaminated Soil Conference (Sept.24-27) Amherst, MA.

Key Projects

Technical Oversight, Landfill, Germany. Providing technical design and oversight for implementation of anaerobic bioremediation of a TCE release from a monofill landfill using molasses to stimulate the reductive dechlorination of TCE and cisDCE.

Chemist, Perchlorate Method Evaluation, OR. Evaluated analytical methods available for the analysis of perchlorate in groundwater containing high concentrations of potentially interfering substances. Developed a laboratory testing program to evaluate two analytical methods relative to this potential matrix interference. The result of the study provided assurance that the common less expensive method would be sufficient for most site samples and that the new more expensive method could be used to provide confirmation where necessary.

Technical Oversight, Manufacturing Facility, MA. Designed a treatability to evaluate anaerobic bioremediation using lactate, emulsified oil, or whey, in situ chemical oxidation using persulfate catalyzed by heat or ferrous iron, and in situ chemical reduction using dithionite and persulfate, in support of technology selection for a mixed chlorinated solvent plume.

Senior Technical Advisor, Manufacturing Facility, MA. Oversight of anaerobic bioremediation for treatment of TCA, TCE and other chlorinated solvents using lactate as a carbon source.

Chemist, Former Aerospace Facility, OR. Providing technical oversight for an anaerobic bioremediation treatability study for the treatment of perchlorate in groundwater.

Technical Oversight, Petroleum Bulk Terminal, NY. Ongoing project to oversee a natural attenuation monitoring program under RCRA for petroleum products at a bulk terminal.

Coauthor, API Protocol Document for Natural Attenuation of MtBE. Project with the American Petroleum Institute (API) to develop a protocol for incorporating natural attenuation into strategies for sites impacted with MtBE. Draft protocol is under review.

Feasibility Study for Drum Disposal Site Impacted with Wastes from Dye Manufacture, MA. Assessed remedial options including soil vapor extraction, groundwater recovery, chemical oxidation, natural attenuation and other technologies for treating soil, groundwater, sediments and surface water. Contaminants included lead, beryllium, 1,2,4-trichlorobenzene, chlorobenzene, toluene, trichloroethene, PAH, pesticides and other organics.

Task Manager, Design of Fluidized Bed Reactor Treatability Study to Treat Consolidation Water from Sludges, CT. Design and technical oversight of treatability study to simulate existing groundwater treatment plant (fluidized bed bioreactor, solids removal, UV/oxidation) and evaluate capacity of system to treat additional waste streams impacted with solvents, metals and semivolatile constituents including 1,4-dioxane, benzidines, chlorobenzenes, and anilines.

Technical Oversight, Remediation Technology Selection and Natural Attenuation Monitoring Program for Site Impacted with Chlorobenzene, NY. Technical oversight for remediation of soil and groundwater impacted with chlorobenzene using aerobic bio-degradation to enhance natural attenuation processes under a NYSDEC Voluntary Agreement.

Lead Author, Impact of Military Maneuvers and Smoke/Soot Plumes on Terrestrial Desert Environments. Conducted literature review for the Kingdom of Saudi Arabia on the ecological damage to terrestrial deserts caused by smoke and military activities such as tank maneuvers and the strategies to repair these damages.

Technical Support, Assessment and Preliminary Evaluation of Chemical, Physical and Thermal Technologies for Oil-Impacted Shoreline, Saudi Arabia. Conducted literature study to evaluate soil vapor extraction, chemical oxidation, thermal desorption, soil washing, and other chemical and physical treatment technologies applicable to oil-impacted sands and sediments (PAH and TPH) under desert conditions; developed treatability protocols for chemical oxidation and thermal treatment.

Technical Support, Feasibility Options for Treating Soils at a Disposal Site in MA. Assessed remedial options including natural attenuation, soil vapor extraction, air sparging, chemical oxidation and other technologies for treating soils impacted with TCE, toluene, naphthalene, PAH, trichlorobenzene and other organics.

Project Manager, Former Chemical Plants Impacted with Mixed Solvents, Argentina. Wrote work plan for SVE and chemical oxidation pilot testing in support of technology selection. Developed remediation alternatives (incorporating the results of pilot testing) for soil and groundwater impacted with multiple solvents including toluene, xylenes, vinyl chloride, 1,2-DCA, trichloroethene, chloroform, and methylene chloride to meet either Argentine standards or site-specific risk-based closure goals.

Technical Lead, Chlorinated Solvent, Hydrocarbons, Explosives and Metal Impacts at Army Ammunition Plant, Missouri. Data gap evaluation, development of technology alternatives, data collection and pilot test work plans for a 4000-acre Army ammunition plant impacted with TCE, DCE, methylene chloride, and other chlorinated solvents, explosives, chromium and arsenic.

Task Manager, Feasibility Study for Chemical Plant Impacted Chlorinated and Non-Chlorinated Solvents, Brazil. Developed remediation alternatives for soil and groundwater impacted with multiple solvents including toluene, TCE, 1,2-DCA and cis-1,2-DCE. Incorporated SVE pilot test data into the alternative development. Dual phase extraction utilizing groundwater recovery to lower the water table with mass removal by soil vapor extraction was the preferred remedy.

QA/QC Officer for Voluntary RCRA Corrective Action at a Defense Contractor Site, CT. Overall responsibility for QA/QC activities associated with the data collection during site remediation for VOCs, PAH, SVOCs, pesticides, metals and PCBs to ensure that all procedures and methodologies were conducted according to the QAPP, including laboratory audits, review of data validation, and coordination with project team.

Technical Oversight, Remediation of Gasoline/Diesel Pipeline Release, NC. Directed treatability studies and provided technical oversight for remediation of an 8-acre petroleum plume. Remediation system consisted of 17 recovery wells, over 90 sparge/vent wells, and a mobile product recovery system. Over a half million gallons of petroleum have been removed within 8 years of system operation.

Technical Oversight, Remediation of Petroleum Releases at Pipeline Pump Station, NC. Provided technical oversight for site investigation and natural attenuation monitoring for petroleum releases from a UST and a sump associated with a pipeline pump station.

Technical Lead, Petroleum Release Associated with Pipeline, Alabama. Provided technical oversight for remediation technology selection, design and monitoring for site impacted with gasoline from an historic pipeline release in Alabama. Applied technologies included soil vapor extraction and natural attenuation, with technology assessments for further source reduction.

Technical Support, Feasibility Study for Industrial Site Impacted with PCBs, NY. Provided technical oversight for technology selection, treatability studies, congener analysis, and additional investigation for river-front site impacted with PCBs.

Technical Lead, Natural Attenuation and Technology Alternatives for Solvent Impacted Site, MA. Developed treatability study workplan to evaluate natural attenuation of chlorinated solvents (including TCE and methylene chloride) and possible technologies to enhance the rate of attenuation. Evaluated site geochemical data and estimated natural attenuation rates and times to closure.

Technical Support, Former Junkyard, MA. Provided technical oversight for remediation of oils contain PCBs by thermally enhanced in situ remediation.

Technical Support, Phthalate Manufacturing Facility, MA. Provided technical oversight for treatability studies, technology selection and implementation at a site impacted with a mixture of phthalates, PAH, PCBs, and alcohols. Technologies include soil vapor extraction for bioremediation, chemical oxidation, capping and excavation.

Technical Lead, Intrinsic Biodegradation of Hydrocarbons (Multiple Sites). Initiation and oversight of natural attenuation monitoring programs at numerous sites impacted with gasoline and/or fuel oil hydrocarbon.

Technical Oversight, RCRA Monitoring Program and ICM at Petroleum Terminal, NY. Oversight of monitoring program for disposal area at RCRA site; feasibility analysis for interim corrective measures for site.

Technical Oversight, Design of Soil Treatment Facility, Terminal, NY. Provided technical oversight for the design and monitoring of an engineered biopile treatment facility for petroleum-impacted soils at a small terminal.

Technical Lead, Soil Vapor Extraction and Air Sparging of Gasoline and other Petroleum Products (Multiple Sites). Technology selection and oversight of soil vapor extraction and air sparging systems to remediated gasoline and other light petroleum products at numerous sites in 19 States across the US. Work included development of pilot test work plans, contributions to system design and oversight of system operation and closure.

Technical Lead, Use of MTBE to TBA Ratios at Petroleum Sites. Conducted literature review and reaction rate analysis to predict the ratios of MTBE to TBA that might be expected at sites where releases of MTBE- and TBA-containing gasolines had occurred.

QA Officer for Industrial Site Impacted with Chlorinated Organics, NY. Data quality review of soil and groundwater analyses conducted for the remedial investigation; preparation of data usability reports; review of field sampling quality and adherence to the QAPP and RI/FS work plan.

Technical Lead, Feasibility for Remediation of Mixed Pesticides, United Kingdom. Investigated the feasibility of in situ bioremediation and chemical oxidation of a mixture of organochloride and organophosphate pesticides at a former pesticide manufacturing facility.

Technical Support, Fate of Cyanide from MGP Wastes in Environment, MI. Investigated the fate of iron cyanide complexes from purifier box wastes at a manufactured gas plant site impacted with coal tar constituents including PAH. Remedial action plan prepared.

Technical Support, Feasibility of Reducing Copper Migration, CT. Investigated in situ chemical fixation of copper as a means of reducing the migration of copper in the subsurface.

Technical Support, Reduction of O&M Costs Associated with Groundwater Recovery and Treatment at Superfund Site, OH. Investigated cause and treatment for fouling (biological and chemical) in treatment train and natural attenuation as means for reducing costs to recover and treat groundwater by over 50%.

Technical Lead, Pilot-Scale Comparison of Two Bioreactors to Activated Carbon for the Treatment of Groundwater Impacted with MGP Wastes, NY. Compared the performances of a fixed film bioreactor and a fluidized bed bioreactor with conventional treatment with activated carbon for the treatment of groundwater impacted with coal tar constituents (BTEX and PAH) at a former manufactured gas plant (MGP) facility.

Uptake of Metals from Composted Sludges into Plants and Cattle, CA. Researched literature to estimate metal uptake by cattle fed plants grown on land treated with composted sludges, in support of a risk analysis.

Technical Lead, Bioventing Pilot Testing for Treatment of Phthalates at a Superfund Site in Indiana. Design of laboratory and field pilot testing to evaluate the feasibility of using soil vapor extraction to introduce oxygen to treat mixed phthalates in vadose zone soils by bioventing.

Technical Lead, Demonstration Project Using Biovent/Biosparge Followed by Ozone for Coal Tar Impacted Soil and Groundwater for a Utility, NY. Demonstrated the use of soil vapor extraction and air sparging, followed by ozone sparging, for the treatment of soil and groundwater impacted with coal tar constituents (including BTEX and PAH) by a combination of volatilization, aerobic biodegradation, and chemical oxidation. The demonstration project involved a laboratory feasibility study and an extended pilot test.

Technical Lead, Intrinsic Bioremediation of Halogenated Hydrocarbons, NY. Technical lead on a project to demonstrate the attenuation and mass reduction of chlorinated aliphatics (including PCE, TCA, TCE, 1,1-DCA, 1,1-DCE, EDB, carbon tetrachloride, and methylene chloride) by naturally occurring intrinsic biological mechanisms. The site involves multiple overlapping groundwater plumes.

Technical Support, Intrinsic Attenuation of Pentachlorophenol, MI and FL. Providing technical oversight of two projects to follow intrinsic attenuation of pentachlorophenol in groundwater.

Project Scientist, Soil Vapor Extraction to Support Bioventing of Diesel At a Rail Yard, CT. Designed laboratory treatability and field pilot testing for using SVE to introduce oxygen into the subsurface to treat diesel contamination in shallow soil. Provided conceptual design and oversight of full-scale remediation system.

Expert Witness for Applicability of Bioremediation, KY. Served as an expert witness and testified in court to support client's choice of bioremediation as the remediation technology for mineral spirits.

Task Manager, Feasibility Study for Treatment of Wastes from Steel and Coke Manufacture, NY. Designed and managed a feasibility study for the selection of treatment technologies for the remediation of materials from steel and coke manufacturing operations containing a mixture of volatile hydrocarbons (including), tars with PAH, and metals. Technologies investigated included soil vapor extraction, steam stripping, bioremediation, solidification and thermal treatments for both in situ and ex situ application.

Litigation Support, Estimation of Timing of Petroleum Release, Iowa. Estimated timing and/or source(s) of petroleum releases at over twenty sites for a major petroleum company based on site data including occurrence of separate phase hydrocarbon, ratios of BTEX constituents, natural attenuation rates, chromatographic fingerprint data and presence of various gasoline additives (MTBE, TBA and alkylleads).

Project Manager, Risk Evaluation and Remediation Technology Selection, Connecticut and Illinois.

Assessed the environmental contamination and associated risk to human health at two metal pipe manufacturing facilities impacted with TCE, copper sludges, PAH and TPH; calculated risk-based cleanup objectives; evaluated applicable remediation technologies and estimated remediation costs.

Project Scientist, Feasibility Study for the Use of Nitrate to Support *in situ* Bioremediation, OH. Investigated nitrate as an electron acceptor to support *in situ* biodegradation of gasoline in an anaerobic aquifer. Nitrate was under consideration since an aerobic process would be difficult to implement due to the impermeability and degree of stratification in the aquifer.

Technical Support and Design, Biostabilization of #6 Fuel Contamination in the Vadose Zone, NH. Provided technical support and design services for the remediation of TPH, PAH, and other compounds in #6 fuel oil by biostabilization. The bioremediation system includes soil venting for aeration and bimonthly nutrient injection via vertical injection points and a lateral injection gallery. The goal of the project was to reduce the mobile constituents of the fuel in order to protect the groundwater.

Technical Support, Bioremediation under Nitrate-Reducing Conditions, OH. Provided technical support on a project to investigate the use of nitrate-reducing bacteria for the bioremediation of petroleum hydrocarbons. Nitrate was shown to stimulate biological degradation in soil and groundwater from the site.

Technical Support, Treatment of a Gasoline/Diesel Mixture using Vent/Sparge Aeration, NC. Technology selection and conceptual design of an *in situ* remediation system for gasoline/diesel contamination resulting from an aboveground pipeline spill. A system of 90+ combined soil vapor extraction/air sparging points has been installed throughout the 8-acre plume to extract hydrocarbon vapors and to provide oxygen to support biological degradation. Work included review of monitoring data for volatilization and biodegradation rates and changes in petroleum composition in support of closure.

QA Officer, Biological Treatability Testing, SUPERFUND Site. Responsible for QA/QC of organic and inorganic laboratory analyses conducted as part of a bioremediation feasibility study.

Project Manager, Bioreactor for Treatment of Chlorinated Solvents, MA. Developed a bioreactor for the treatment of water contaminated with chlorinated ethenes. During the initial National Science Foundation (NSF) sponsored phase, Dr. Leahy directed the development testing of a bench-scale reactor utilizing methanotrophic bacteria capable of oxidizing chlorinated solvents. In a second phase sponsored by the Gas Research Institute (GRI), the feasibility of full-scale implementation of this technology was evaluated.

Technical Support, *in situ* Bioreclamation of Gasoline Contamination, CA. Provided technical and laboratory support for the design and operation of an *in situ* bioreclamation system using soil vapor extraction for gasoline at the site of a former service station. Hydrocarbon and BTEX concentrations in soils and groundwater reached nondetectable levels within six months.

Project Supervision, Land Treatment of No. 6 Fuel Oil Contaminated Soils, FL. Provided oversight management of a land treatment project for a southern utility company for the biological remediation of soils heavily contaminated with No. 6 fuel oil with a comprehensive monitoring program for PAH, TPH and other compounds. Laboratory feasibility testing provided design parameters. Comparison of field and laboratory data showed excellent correlation.

Technical Support, Forced Aeration Soil Pile for the Remediation of Diesel-Contaminated soil, CA. Provided technical and laboratory support for the design and maintenance of a forced aeration soil pile for the remediation of soil contaminated with diesel fuel. Process monitoring data provided evidence of insufficient aeration in a portion of the pile and allowed remedial measures to be undertaken.

Bioremediation Team Lead, Feasibility of Biotreatment of Methylmethacrylate at a SUPERFUND site, NJ. Designed the bioremediation component of a feasibility study to evaluate an effective treatment train for the remediation of methylmethacrylate contamination in soils at a SUPERFUND site.

Treatability Study Leader, Feasibility of Using In Situ Bioremediation for Toluene and Acrylonitrile, CT.

Designed and conducted a biological treatability study to assess the feasibility of treating soil and groundwater contaminated with toluene and acrylonitrile at a chemical manufacturing facility. Laboratory testing showed rapid biological degradation of toluene and acrylonitrile under aerobic conditions and supported the design of an in situ bioremediation system for soil and groundwater.

Biodegradation Potential of Acetone, Benzene and Toluene in Soils, MA. Data supporting the attenuation of plume of acetone, benzene and toluene by naturally occurring biological degradation in a contaminated aquifer were generated using laboratory microcosms. Rates of mineralization of C¹⁴, radiolabeled compounds were measured in unamended soil/water samples.

Research Manager, Biodegradation of 4- and 5-ring PAH in Coal Tar, MA. Managed an NSF-funded project to develop innovative strategies to stimulate the biological degradation of 4- and 5-ring PAH, constituents of coal tar and petroleum products, which are normally recalcitrant to bacterial oxidation. The use of co-metabolites and agents to increase solubility and desorption of these compounds were investigated.

Technical Support, Sequential Anaerobic/Aerobic Treatment of Chlorinated Aliphatics, MA. Provided technical support on a research and development project to investigate the use of sequential anaerobic/aerobic biological processes to treat chlorinated solvents such as tetrachloroethene in aquifer environments. The two-step process involves first reductive dechlorination under anaerobic conditions followed by methanotrophic degradation in the presence of methane and oxygen.

Project Manager, Laboratory Treatability Studies for Gasoline, Multiple Sites. Designed and conducted treatability studies for bioremediation of gasoline releases for over 20 sites across the country.

Technical Support, Composting of Coal Tar Impacted Soils, MA. Provided technical support for a project co-funded by the EPA and a utility company to demonstrate the feasibility of biological treating coal tar impacted soil by composting at bench- and pilot-scale.

Project Manager, Biodegradation of Adsorbed Jet Fuel, MA. Managed a project funded by the US Air Force to investigate the potential of the biological remediation of

jet fuel adsorbed to soil particles. The study covered both saturated and vadose zone systems.

Technical Support, In Situ Biological Treatment of Coal Tar for a Utility, Vermont. Design and implementation of an in situ bioremediation system for a New England utility to control seeps of a light mobile coal tar fraction to an adjacent river. The composition of the seeps showed a high percentage of monoaromatic compounds with PAH and was demonstrated in laboratory feasibility testing to be amenable to biological degradation.

Technical Support, Land Treatment of Coal Tar Impacted Soils, CT. Provided technical support for a project funded by the EPA and a New England utility company to demonstrate the feasibility of biological treating soil impacted with PAH in coal tar by land treatment on a pilot scale.

Project Manager, Metabolic By-products and Mechanism of Chlorinated Ethene Degradation, MA. Investigated the intermediates and products of the co-oxidation of chlorinated aliphatic compounds (TCE, DCE, TCA, chloroform, methylene chloride) by methane-oxidizing bacteria for this NSF-sponsored study. The detection of transient intermediates suggested the mechanism of TCE and DCE oxidation went via formation of an epoxide intermediate with complete mineralization to carbon dioxide.

Representative Litigation

Consulting Expert, Potential Source of Perchlorate Impacts to Drinking Water and Surface Water. Provide technical support for investigation of the potential sources of perchlorate found in drinking water supply wells in a complex bedrock environment.

Expert Witness, Intermingled Chlorinated Solvent and Petroleum Plumes. Evaluated site data to distinguish contaminant sources in commingled plumes.

Expert Witness, Cost of Remediation of Mixed Organic and Inorganic Contamination. For a site impacted with multiple organic and inorganic contaminants, developed remediation "what-if" scenarios and related costs that would have been incurred if the site had only been impacted by one contaminant; in support of cost allocation.

Litigation Support, Multiple Petroleum Sites for Major Petroleum Company. Review of forensic analysis of fingerprint and gasoline additives (alkyl leads, MTBE, TBA, etc.) from multiple gasoline station sites in the East and Mid-West in support of potential litigation regarding timing of releases.

Expert Witness, Wood Tar Site, New York. Identified hazardous constituents from wood tar at a manufacturing facility in upstate New York.

Consulting Expert, Litigation Support Regarding Deterioration of Polyester Pipe Coating, New Jersey. Provided support to counsel regarding mechanisms of deterioration of polyester and polyether plastics in environmental applications.

Litigation Support, Estimation of Timing of Petroleum Release, Iowa. Estimated timing and/or source(s) of petroleum releases at over twenty sites for a major petroleum company based on site data including occurrence of separate phase hydrocarbon, ratios of BTEX constituents, natural attenuation rates, chromatographic fingerprint data and presence of various gasoline additives (MTBE, TBA and alkylleads).

Expert Witness, Impact of Surfactants and Hydrotropes on Fate & Transport of Other Chemicals at Two Superfund Sites, New Jersey. Investigated the fate of sulfonates in the subsurface environment and the impact of their presence on the fate and transport of other contaminants. Sulfonates included dodecyl benzene sulfonate, xylene sulfonate and other alkylbenzene sulfonates. Review of historical chemical manufacturing processes to link other site contaminants (chromium, copper, etc.) to processes.

Litigation Support, National Class Action Regarding Gasoline Stations. Conducted historical review of the use of TPH analyses and the development of bioremediation and natural attenuation as remedial strategies for gasoline-impacted sites; surveyed States' acceptance of natural attenuation for petroleum sites; surveyed States' analytical requirements for petroleum sites; surveyed the historical use of alkyl leads and oxygenates as gasoline additives.

Litigation Support, Hazardous Waste Characterization of Sludges, New Jersey. Review of historical data, analytical changes over time, and historic handling of the sludges as it relates to the characteristics of sulfides in the sludges. Data quality review of historical volatile organic, inorganic and hazardous characteristics data.

Expert Witness for Applicability of Bioremediation, Kentucky. Served as an expert witness and testified in court to support client's choice of bioremediation as the remediation technology at a site impacted with mineral spirits.

Litigation Support, Investigation of the Historical Manufacturing Practices at a Chemical Plant, New Jersey. Researched historical documents and depositions to identify the chemical manufacturing processes and disposal practices conducted at a chemical manufacturing facility over the past five decades. The processes included the syntheses of phthalate, sebacate and trimellitate plasticizers, dielectric fluids, benzyl chloride and phthalic anhydride, using PCBs as heat transfer fluids. The research covered identification of raw materials, impurities, end products and by-products and their fate in the environment.

Justin A. Desrosiers



Mr. Desrosiers has over three years of experience in environmental consulting and engineering with ERM's Boston office.

Mr. Desrosiers' primary responsibility is conducting human health Risk Assessments and supporting risk based remediation efforts under the Massachusetts Contingency Plan (MCP). He has worked as the lead risk assessor, supported risk project teams, and provided critical third-party reviews of competitors' human health and ecological Risk Assessments. He has completed risk evaluations at more than 30 sites in Connecticut, Florida, Georgia, Massachusetts, New York, North Carolina, Rhode Island, Vermont, Wisconsin, Brazil, and Germany.

In addition to his Risk Assessment efforts, Mr. Desrosiers has served as a data manager, developed risk-based remedial goals, and managed site investigation and remedial work. He has also been involved in planning site investigation work and has field experience at electronics, chemical, and power utility facilities.

Mr. Desrosiers has a strong grasp of environmental regulations in the United States, specifically in the state of Massachusetts.

Registrations & Professional Affiliations

- Society of Risk Analysis NE Chapter
- Air & Waste Management Association

Fields of Competence

- Human Health Risk Assessment
- Planning and Managing Site Investigation and Soil Excavation Work
- Data Management and Analysis
- Soil, Sediment, Surface Water, Indoor Air, and Groundwater Sampling Fieldwork

Education

- M.S. Civil and Environmental Engineering (with a focus in Environmental Health); Tufts University, Massachusetts, 2004
- B.S. Biology and B.A. Environmental Studies; Tufts University, Massachusetts, 2002

Conferences

- SETAC 2005, Baltimore Maryland.
- Air & Waste Management: Vapor Intrusion: The Next Great Environmental Challenge, 2006 Los Angeles, California.

Publications

Kaiser, R. et al., 2002. "Final Separation and Extraction of Plutonium in Mixed Waste," Work Performed under DOE Award Number: DE-AC26-01NT41308, December 2002.

Kaiser, R., Desrosiers, J., & Kulczyk, A., 2004. "Decontamination of Surrogate Pu 238 Legacy Wastes," Presented at the Ninth International

Symposium on Particles on Surfaces Philadelphia, PA, 17 June 2004.

Key Projects

Provided a range of support, from field sampling to project management, for the decommissioning of a Massachusetts nuclear power plant. Conducted field sampling for sediment and soil. Compiled and managed the field sampling dataset for sediment, soil, and groundwater. Analyzed site data to determine the extent of remedial efforts required under the MCP and TSCA regulations. Planned sampling events, prepared field sampling plan documents, and managed the completion of field sampling activities. Assisted with wetlands permitting and TSCA permitting for the removal of PCB impacted sediments and soils. Prepared notifications and reports for submittal to the DEP and EPA. Regularly interacted with and provided input to the client, other consultants, and the decommissioning contractors. Managed field activities for the TSCA soil removal program, reviewed documentation and analytical results, provided recommendations for additional soil removal, and prepared the Final TSCA Closure Reports.

Conducted a Risk Characterization for a Superfund site on Long Island, New York. Participated as a member on a three-person project team that evaluated potential risks associated with residential and commercial exposure to impacted groundwater. Modeled down-gradient exposure to ambient air due to volatilization from a holding pond and modeled potential indoor air concentrations in residential buildings using the Johnson and Ettinger Model for Subsurface Vapor Intrusion into Buildings.

Performed a Risk Characterization for the upland placement of dredged sediment at a proposed LNG terminal in Massachusetts. Supported environmental liability discussions between the client and former owner of the site. Assisted in preparation of reports for submittal to regulatory agencies.

Performed product risk assessments on chemicals for a medical device manufacturer and a petrochemical

producer. Evaluated ecological effects of each chemical and researched US, Canadian, European, and Japanese human health and ecological standards.

Conducted several Risk Characterizations for fuel oil spills in residential properties. Evaluated risk associated with groundwater, soil, indoor air, and modeled indoor air results. Completed and submitted Response Action Outcomes to the Massachusetts Department of Environmental Protection. Performed indoor air modeling using site-specific input parameters in the Johnson and Ettinger Model.

Produced a Risk Characterization for a former research and development site with impacted groundwater extending under the facility, a residence, and a farm. Developed an irrigation scenario based on the "shower model" to represent potential exposure for a farm worker to VOCs volatilizing from groundwater. Modeled potential down-gradient indoor air concentrations with the Johnson and Ettinger Model using site-specific input parameters.

Conducted a human health risk screening for potential indoor air impacts at a proposed mall in Berlin, Germany. Predicted indoor air concentration from VOCs in groundwater using the Johnson and Ettinger Model.

Performed a third party review of baseline human health and ecological Risk Characterizations for the Shpack Landfill Superfund Site in southeastern Massachusetts. Activities included reviewing Risk Characterization documents, preparing technical memoranda of findings, and interfacing with EPA Risk Assessors. Supported the ERM team by calculating preliminary remediation goals (PRGs) and determining areas that required remediation at this Superfund site.

Performed numerous risk screening evaluations for soil, groundwater, sediment and indoor air (measured concentrations and modeled with the Johnson and Ettinger Model) to determine whether further remediation work should be conducted and to verify the relative level of risk existing at the site.