

Fields of Specialization

- ▶ Risk-based Site Closure
- ▶ In Situ Remediation of Chlorinated Solvents
- ▶ In Situ Remediation Product Development and Application
- ▶ Biogeochemistry
- ▶ Microbiology
- ▶ Medical Toxicology
- ▶ Environmental Forensics
- ▶ Human Health Risk Assessment
- ▶ Litigation Support/Expert Witness Testimony
- ▶ Ecological Risk Assessment
- ▶ Aquatic Toxicology
- ▶ Oil Field Legacy Sites
- ▶ Agency Negotiations

Credentials/Registrations

- ▶ Post-doctoral Fellowship, Veterinary Toxicology, Louisiana State University School of Veterinary Medicine, 1989.
- ▶ Ph.D., Pharmacology and Toxicology, West Virginia University School of Medicine, 1988.
- ▶ B.S., Biology (Education), University of Missouri, 1979.

Professional Affiliations and Memberships

- ▶ International Society of Environmental Forensics
- ▶ Society of Environmental Toxicology and Chemistry
- ▶ Society for Risk Analysis
- ▶ American Society for Testing and Materials (ASTM)

BRADLEY F. DROY, PH.D. *President and CEO*

Career Summary

Dr. Droy is President & CEO of Toxicological & Environmental Associates, Inc. (TEA, Inc.), an environmental consulting firm headquartered in Baton Rouge, Louisiana and founded in 1996. Prior to co-founding TEA, Inc., Dr. Droy worked in academia and industry and managed both human health and ecological risk assessment teams for nationally and internationally recognized environmental consulting firms.

Dr. Droy specializes in closing sites using unique vetting, selection, design, and application of in situ remedial products and technologies and risk assessment. Some key highlights of Dr. Droy's career include:

- Developed the conceptual approach and co-designed the largest in situ bioremediation project for chlorinated solvents in groundwater that was known at the time in the late 1990's;
- Worked with NASA scientists and engineers to bring Emulsified Zero-Valent Iron (EZVI) to the environmental marketplace by co-developing the license agreement for this US Inventor's Hall of Fame NASA-patented product (TEA, Inc. was the recipient of the first NASA EZVI license in 2003);
- Closed multiple contaminated sites using innovative in situ remedial technologies and risk-based approaches in several states; and
- Worked on over 60 litigation cases, involving a wide-variety of subjects including remediation, toxicology, risk assessment, pharmacology, and medically-related health concerns.

Dr. Droy is an expert in the integration of multiple disciplines to achieve site remedial objectives, including, but not limited to: toxicology, risk assessment, remediation engineering, remediation products, hydrogeology, phytoremediation, biogeochemistry, statistics, kinetic analysis, microbiology, environmental chemistry, modeling, and legal/regulatory interpretation and application. Dr. Droy resides in Santa Rosa Beach, Florida where TEA also maintains a regional office.

Experience Summary

Litigation/Expert Reports

- Provided non-testifying expert services in expert witness interviews, forensic analysis, natural attenuation, toxicology and bioremediation services for a class action lawsuit in Federal Court in Louisiana.
- Lead testifying toxicologist for a class action herbicide Federal Court case centered in Madison County, Illinois.
- Lead toxicologist for a PCB-contamination case in Mississippi.
- Testifying expert for a class action lawsuit pertaining to a solvent release in Lake Charles, Louisiana.
- Past and currently working on multiple oil-field waste cases in Louisiana; supporting the cases with expert services related to toxicology, risk assessment, natural attenuation studies, forensic analysis, data validation and remedial estimates.
- Provided oversight of sampling activities for a natural gas pipeline rupture site in Baytown, Texas.
- Provided expert services before the Department of Justice to negotiate a Mercury Cleanup Level for mercury spills in a wildlife refuge in Louisiana.
- Project manager for a high profile brownfields litigation case involving risk-based corrective action (RBCA) at a petroleum contaminated site in Louisiana. The case has been closed and the site has been remediated.
- Provided defendant litigation support, including deposition, in lawsuit involving Proposition 65 in California. A settlement agreement in favor of the defendant was won in the case.
- Project manager for a risk assessment in Mississippi prepared for litigation in response to potential residential effects due to groundwater exposure to pesticides. Toxicological support on this project involved litigation related services including medical file reviews.
- Provided expert witness work on six Cesium-137 cases in St. Gabriel, Louisiana.
- Provided litigation support, including deposition and expert testimony, in lawsuit involving oil field waste in Louisiana. The trial was held in early 2000.
- Provided litigation support and expert testimony, in lawsuit involving oil field waste at a truck washing facility in Texas. The trial was held in April 2000.
- Provided litigation support and deposition for two oil field waste cases in Louisiana. One case went to trial and one settled.
- Provided litigation support for a project involving a release of 1,2-dichlorethane (EDC) from a barge terminal in Lake Charles, Louisiana.
- Provided litigation support including expert opinions for an oil field truck washing facility in Citronelle, Alabama.
- Provided expert input related to biodegradation of volatile organic compounds including chlorinated organic constituents in barrels recovered from the Mississippi River for a shipyard in Louisiana.

- Prepared a risk assessment for the defendant in anticipation of class-action litigation against a barge company in Nashville, Tennessee. The project involved the water intake of oil contaminants and potential exposure to the public associated with an oil spill in the Mississippi River.
- In preparation for a state hearing, prepared structure/activity assessments for risk analysis of a myriad of constituents including chlorinated organics released to surface water from an active agricultural chemical facility in southern Louisiana.
- Provided adjudicatory hearing input regarding toxicological issues in support of a hazardous and solid waste blending facility-operating permit in southern Louisiana.
- Provided human health risk assessment input regarding gasoline domestic well water contamination for a litigation case in North Carolina.
- Served as an expert for a mercury contamination class action case in McIntosh, Alabama.
- Retained as an expert witness to assess the toxicity of oil field-related wastes at approximately a dozen sites in south Louisiana coastal marshes. A deposition was also taken during this project. The case was settled.
- Project manager for a risk assessment demonstrating acceptable VOC (trichloroethylene) concentrations in shallow groundwater used for industrial purposes in southern Florida.
- Developed two expert reports for the Louisiana Chemical Association (LCA) in regard to proposed risk assessment rules for the state of Louisiana.
- Provided expert witness support for a fly ash aquatic toxicology lawsuit in Oklahoma. The trial is set to begin August 2002; the case settled.
- Provided trial testimony for a groundwater contamination case in Amite, Louisiana.
- Provided expert technical support for two PCB contamination cases, one in Connecticut and one in California.

CERCLA Program/State Superfund

- Project manager for a multi-disciplined risk-based remedial action project in Mississippi that involves the remediation of creosote-impacted soils, groundwater, and sediments. This project involved the use of phytoremediation for soils and shallow groundwater, the first phytoremediation project in the State of Mississippi.
- Project manager for large ecological risk assessment for a high profile Superfund site at an Air Force Base in south Florida. This project involved multiple contaminants, hydrogeology, analytical chemistry, aquatic toxicology, sediment toxicology testing, groundwater and surface water modeling, numerous field studies and significant regulatory interaction with USEPA and the State of Florida Department of Environmental Protection.
- Project manager for a DDT/pesticide soil and groundwater contamination project in College Station, Texas. The site is being managed under the State of Texas Voluntary Cleanup Program and Texas Risk Reduction Rules.
- Project manager for two fuel spill risk assessments at an Air Force Base in New Mexico.
- Manager of a human health and ecological risk assessment for a former waste oil reclamation facility in southern Louisiana. This CERCLA site also has significant litigation issues ongoing.
- Task manager of an ecological risk assessment team analyzing the potential environmental impacts of numerous hydrocarbon-contaminated groundwater plumes on biota in the Florida Intracoastal

Waterway at Port Everglades. This high profile environmental project involved human health and ecological risk assessment, intrinsic bioremediation, and groundwater modeling. This project included working closely with legal counsel to determine correct application of risk assessment results to State of Florida regulations. The results were accepted by the State of Florida Department of Environmental Protection.

- Managed a risk assessment team that evaluated the potential human health and ecological effects of mercury, chlorinated organics and pesticides at a major Superfund site in Alabama. The human health risk assessment was accepted by USEPA Region IV and the State of Alabama Department of Environmental Management.
- Provided risk analysis for an intrinsic bioremediation study at a waste oil site in Mississippi. The results of this study were accepted by the Mississippi Department of Environmental Quality.
- Project manager for a risk assessment for a state superfund site in Arkansas. This project involved over a dozen legal professionals representing a large PRP (Potentially Responsible Parties) group associated with a former hazardous waste blending facility. The results of the risk assessment have been accepted by the State of Arkansas.
- Performed the human health risk assessment and environmental evaluation for a federal Superfund site in Louisiana adjacent to a residential area that involved hydrocarbon contamination of groundwater and soils. The risk assessment was accepted by USEPA Region VI and the State of Louisiana.
- Managed a human health and ecological risk assessment team that evaluated a Texas State Superfund site. This abandoned site contained significant petroleum contamination in groundwater and soils. The human health risk assessment was accepted by the State of Texas.
- Served in a senior advisory role for a CERCLA risk assessment for a landfill in Wisconsin.
- Managed a risk assessment team that evaluated potential human health and ecological effects from estuarine mercury contamination at Lavaca Bay, Texas, located on the Gulf Coast. The project has been upgraded to CERCLA status.
- Performed human health risk assessment calculations on organics, inorganics and radioactive isotopes and management oversight for a major Superfund site in Texas (Tex Tin). This project has been placed on hold by USEPA Region VI.

RCRA

- Provided the risk analysis for an intrinsic bioremediation study on chlorinated organics (1,2-dichloroethane) for a facility in southern Louisiana. This study was accepted by the Louisiana Department of Environmental Quality.
- Project manager for a risk assessment project for a client in North Carolina (Region IV RCRA site) that utilized risk assessment to design an approach to the facility-wide RFI. A risk-based RFI Work Plan is currently pending comment from USEPA Region IV.
- Lead risk assessor for a human health and ecological risk assessment for an active industrial facility in Rhode Island. The major constituents of concern at this facility are chlorinated organics. The site is located adjacent to the South Branch Pawtuxet River and involves community risk issues, intrinsic bioremediation, and agency negotiation with the Rhode Island Department of Environmental Management.

- Task manager for an ecological assessment for an active industrial facility adjacent to the Escambia River in Pensacola, Florida.
- Project manager of a risk assessment for a forestry products industrial client located in Mobile, Alabama.
- Lead risk assessor for a human health and ecological risk assessment at a chlorinated solvents site in Glenville, West Virginia.
- Lead risk assessor for a pesticide risk assessment at an active industrial facility in Texas. The site is adjacent to the Port of Houston and Houston Ship Channel and involves pesticides and chlorinated organic fate and transport, human health and ecological risk assessment, intrinsic bioremediation, and hydrogeological modeling.
- Manager of a risk assessment team that evaluated potential human and ecological risks from groundwater and soil contamination at an active industrial facility in southern Louisiana. A no-action, monitoring only remediation scenario was accepted by the Louisiana Department of Environmental Quality.
- Developed risk assessment work plan for a risk-based intrinsic bioremediation study for a petrochemical facility in Louisiana.
- As part of an RFI team, provided soil cleanup levels for various contaminants at a chemical industry in Mississippi. The project scope is still pending.
- As a part of a RCRA facility investigation, managed a risk assessment team that evaluated the human health and ecological impacts of an aniline spill area located at an active industrial site in southern Louisiana. The risk assessment results were accepted by the State of Louisiana and a no-action groundwater-monitoring program was approved by the state.

Other Miscellaneous Projects

- Lead technical consultant for the design of treatability studies for the use of EZVI for the treatment of Freon 113 and carbon disulfide.
- Lead technical consultant for a brownfields site in Miami, FL that is contaminated with chlorinated solvents.
- Co-authored a “white paper” on chromium bioavailability for a natural gas pipeline client.
- Lead toxicology and remedial architect for a closure in Louisiana for a high profile former train derailment site.
- Provided green and sustainable evaluations in support of the bankruptcy trustee evaluation for the “old General Motors” (Motors Liquidation Company) portfolio of 89 legacy sites located in Michigan, Ohio, Illinois, Indiana, Louisiana, and New York.
- Lead risk assessor for a human health and ecological risk assessment for a natural gas pipeline expansion project on Lake Pontchartrain, Louisiana.
- Project manager for a risk assessment related to mercury manometer spills in the Monroe (Louisiana) Gas Field. This project involved human health and ecological risk assessment, aquatic toxicology, litigation, and negotiation with the Department of the Interior and Department of Justice. A negotiated solution was reached resulting in a savings to the client of over \$ 3 million.
- Senior Project Advisor for the design and implementation of perhaps the largest bioremediation project ever attempted for chlorinated organics in groundwater. The project is located in northern

California and is ongoing. The accepted remediation has resulted in a cost savings of at least \$100 million by the client.

- Senior Project Advisor for a risk-based remediation project for a trichloroethene (TCE) groundwater contamination at a Port facility in Cape Canaveral, Florida. A unique combination of risk assessment, active pumping, natural attenuation, chemical oxidation, and bioremediation has been utilized at this site. The project is ongoing and a no further action proposal has been written and submitted to the FDEP.
- Project manager for a pilot phytoremediation project at a former creosote-processing site in southern Mississippi.
- Project manager of a multi-disciplinary team of ecologists, toxicologists, modelers and chemists that investigated potential PCB exposures to humans via a fish ingestion pathway on the Ottawa River in Toledo, Ohio. This team provided the necessary approach needed to accurately address potential human health risks due to leachate originating from a landfill.
- Project manager for an air toxics project for a major oil refinery in southern Louisiana that involved preparation of an alternative carbonyl sulfide air toxics standard that was successfully negotiated, saving the client approximately \$7 million.
- Team member of a large mercury remediation project for a client in Pittsburg, California. Input to this project has included mercury geochemistry, water sampling techniques, and biological sampling design. The project is ongoing.
- Project manager for UST site closure and risk assessment for a former gasoline station site in southern Louisiana. Cleanup levels for benzene of 7,000 ug/l were accepted by the LDEQ. The site has been closed using risk assessment.
- Hired as lead risk consultant for the Louisiana Chemical Association and other clients to comment on the Louisiana risk assessment (RECAP) program.
- Project manager of human health risk assessment team that prepared two risk assessments for a major utility company in Louisiana.
- Provided risk assessment support for pipeline companies throughout the southeast in regard to total petroleum hydrocarbons, mercury and PCB exposures.
- Project manager for a risk-based closure for BTEX-contaminated soils and ground water at a petroleum refinery in southern Louisiana. Closure activities are necessary for this site in order to pursue industrial construction permits. The results provided support for pursuance of construction permits.
- Provided toxicological input on tetraethyl lead contamination at a refinery in New Jersey.
- Managed a risk assessment team that analyzed potential human health hazards from exposure to contaminated ground water originating from a pulp and paper mill in southern Louisiana. The project is currently on hold pending additional investigations at the site.
- Lead risk assessor for a risk-based closure project related to chlorinated organic contamination in groundwater at an active industrial chemical facility in Louisiana.
- Lead technical consultant for an aluminum company in southern Louisiana regarding a sustainable development feasibility study for coastal restoration under the Breaux-Johnston Bill.
- Provided risk input for a vapor intrusion study on VOC exposure to workers at an active facility in Geismar, Louisiana.

- Conducted a risk assessment and target cleanup level calculation for a Phase II site assessment/property transfer transaction for a site in West Virginia involving multiple contaminants.
- Provided health-based target cleanup levels for remediation of polycyclic aromatic hydrocarbon-contaminated soils at a site in southern Louisiana. A no-action scenario regarding remediation of this site was accepted by the Louisiana Department of Environmental Quality, the first site approved for risk-based closure in the State of Louisiana.
- Task leader of literature review team evaluating the human health and ecological impact of inland water oil spills. This project, performed for the American Petroleum Institute, involved the development of a guidance document for response action.
- Performed a risk assessment for mineral oil - based total petroleum hydrocarbon exposures for a major utility company in Texas.
- Project manager for four RECAP closures that received no further action letters from the LDEQ.
- Senior project advisor for multiple brownfield evaluations performed for the Louisiana Department of Environmental Quality and the East Baton Rouge Parish. TEA, Inc. has been awarded multi-year brownfield consulting projects in the State of Louisiana.
- Senior project advisor for the research and development of multiple green and sustainable product lines, including two NASA patents (Emulsified Zero Valent Iron (EZVI) and Activated Metal Treatment System (AMTS)); negotiated and was awarded licenses by NASA for both of these patented products for use in the remediation market. AMTS is a patented technology used in the remediation of PCBs; EZVI is used to treat chlorinated solvents and dense nonaqueous phase liquids (DNAPLs).
- Received USEPA acceptance under the National Contingency Plan (NCP) of a new generation oil spill absorbent (PowderSorb); a Finnish product marketed by TEA, Inc. personnel.
- Technical lead for the final remediation of the Livingston Train Derailment site in Livingston, Louisiana; a site that received significant notoriety in the early 1980's due to the destructive nature of the derailment. Chlorinated solvents are the main constituents of concern. This site has been closed.
- Technical and litigation lead for an oilfield remediation that was successfully mediated to closure in southern Louisiana under Act 312.
- Project manager for a project involving preparation of an environmental assessment for a new drug application (FDA-NEPA) for a cosmetic company in Illinois.
- Task manager for a risk assessment associated with leachate from a landfill containing metals in Louisiana.
- Managed and directed numerous aquatic toxicology GLP contract testing programs in compliance with TSCA (Toxic Substances Control Act).
- Developed risk assessment work plan for chlorinated organics and arsenic impacted soils and groundwater for an active facility located in northwest Louisiana.
- Developed groundwater risk-based cleanup goals for chlorinated organics in support of a phytoremediation project in Scott, Louisiana. The site was eventually closed based on the effectiveness of the phytoremediation.

- Designed field studies to address the impact of effluent discharges on aquatic biota and humans in regard to a tetra-ethyl lead plant expansion project in Ontario. This project included an extensive risk communication program including public meetings.
- Developed risk-based cleanup goals for a hydrocarbon contaminated site used to support the oil field industry in southern Louisiana.
- Assessed the environmental and human health impact of exposure to various chemicals, pharmaceuticals, polymers, lubricants, and chemical intermediates.
- Analyzed the mechanisms of fish liver toxicity to hazardous substances.
- Performed FDA-funded pharmacokinetic studies on chemical uptake, disposition, metabolism, and excretion of antibacterial drugs in aquatic species.
- Provided senior peer review on over 100 risk assessment, toxicology and remediation projects.
- Has assisted the National Aeronautics and Space Administration (NASA) in bringing two environmental patents into the commercial marketplace.
- Designed an in-situ bioremediation program for a brownfields site in southern Florida contaminated with chlorinated solvents.
- Oversaw the risk-based closure of a former oil field maintenance facility in Mississippi that was contaminated with chlorinated solvents.
- Peer reviewer for white paper on historical environmental impacts from railroad and railway operations in Texas, focusing on PCBs, metals, and petroleum hydrocarbons.

Technical Reports, Publications and Presentations

Dr. Droy has authored over 150 technical reports and peer reviewed journal articles and has made over 150 technical presentations related to the fields of remediation, toxicology and human health, and ecological risk assessment. He has successfully presented, negotiated, and has received acceptance of his risk assessment and related work in 20 states in the United States. He has also made international presentations related to toxicology and risk assessment in Canada, the U.K., and Europe.

On behalf of his clients, Dr. Droy has also participated in negotiations with high level natural resource trustees including the National Oceanic and Atmospheric Association (NOAA), the U.S. Fish and Wildlife Service (USFWS), the USEPA, various Department of Interior (DOI) and Department of Justice (DOJ) affiliates, the US Treasury Department as well as numerous state environmental protection departments. Dr. Droy also successfully worked with attorneys and scientists from the National Aeronautics and Space Administration (NASA) to develop licensing agreements for TEA, Inc. to market a patented NASA technology for groundwater remediation (emulsified zero-valent iron (EZVI)) and for PCB remediation (Activated Metal Treatment System).

Porterfield, L. and Droy, B. The Effects of EZVI on Carbon Tetrachloride and Carbon Disulfide. Florida Remediation Conference. Orlando, FL. December 2018.

Porterfield, L., Droy, B., Yestrebsky, C., Roberts, J. The Effect of Emulsified Zero Valent Iron on Trichlorethene in the Presence of Chlorofluorocarbon 113. Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies. Miami, FL. May 2017

Bass, A., Porterfield, L., Schell, J., Droy, B. Novel Monitoring Data Presentation Method Provides a Simplified View of the Approach to Compliance Levels. Miami, FL. May 2017

- Porterfield, L., Droy, B. The Effect of Emulsified Zero Valent Iron on Trichlorethene in the Presence of Chlorofluorocarbon 113. Florida Remediation Conference. Orlando, FL. December 2016.
- Droy, B., Akudo, C., Copeland, R., Porterfield, L. Using Synergistic Remediation to Promote the Risk-Based Cleanup of Chlorinated Ethenes at an Historical Train Derailment Site. Tenth International Conference on Remediation of Chlorinated and Recalcitrant Compounds. Palm Springs, CA. May 2016.
- Droy, B., Synergistic Remediation using EZVI, Carbon Sources and KB-1 to Promote Risk-Based Cleanup of Chlorinated Ethenes at a Historical Train Derailment Site. Florida Remediation Conference. Orlando, FL. October 2015
- Droy, B., Booth, J.G., Barber, J., and Cobert, S. Downgradient Enhancement of Natural Attenuation of Chlorinated Solvents Following In-situ Source Area Remediation with Emulsified Zero-Valent Iron (EZVI). Remediation of Chlorinated and Recalcitrant Compounds. The Eighth International Conference. Monterey, California. May 2012.
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- Droy, B. 2010. *Green and Sustainable Remediation Technologies*. Invited presentation. Green Legal Matters Conference, New Orleans, Louisiana. October 2010.
- Droy, B. 2010. “Green” DNAPL Remediation using the Emulsified Zero-Valent Iron (EZVI) Technology. Invited Presentation. Environmental Regulatory Compliance Conference. January 2010.
- Droy, B. 2006. *Toxicology 101*. Invited presentation to the Louisiana Bar Association, Environmental Section. New Orleans, Louisiana.
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