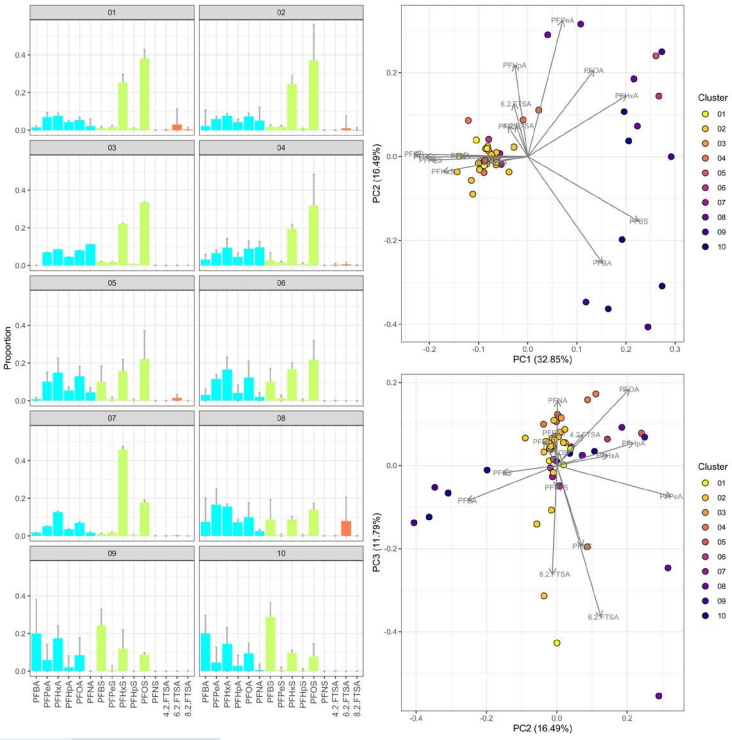
TIG environmental®
INVESTIGATIONS ▾ FORENSICS ▾ REMEDIATION

ENVIRONMENTAL FORENSICS

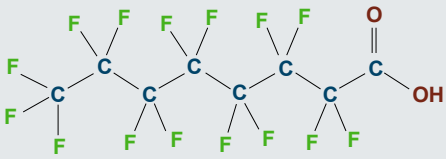
TIG Environmental uses environmental forensics to support site investigation and delineation, source identification, and allocation. We recognize that each situation is unique. By using a weight-of-evidence approach, we can design and execute each analysis to meet the project's specific objectives.

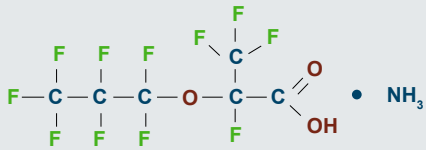
Experience in Legacy and Emerging Contaminants

TIG Environmental's experts have extensive experience in the forensic analysis of contaminants, including dioxins and furans, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and other hydrocarbons, metals, emerging contaminants such as per- and polyfluoroalkyl substances (PFAS), pharmaceuticals, and personal hygiene products.



PFAS





Statistical Data Analysis and Fingerprinting

TIG Environmental is a leader in the use of statistical tools ranging from simple to complex, including tools developed by our own experts. We use these tools to develop and test specific hypotheses regarding the relationships between sources and potential receptors such as impacted environment media. Examples of our tools include:

- Tools for the rapid visual analysis of sample and source profiles
- Weathering models that predict changes in contaminant source profiles
- Evaluation of stable isotopes for fingerprinting
- Multivariate and geospatial methods that compare chemical profiles and spatial trends in samples and sources
- Advanced statistical methods such as Bayesian Analysis and Monte Carlo Simulation

Scaling the Analysis to the Objectives

We believe each forensic analysis should be scaled to meet the specific project objectives. Our extensive experience and diverse forensic analysis toolbox allow us to develop a program designed to address the client's specific needs.
We provide:

- Data management plans and data gap analysis that elucidate project needs early in the project life cycle
- Powerful computational tools for the exploration of large and small datasets
- Project planning assistance including understanding available data and historical information, determining project goals and possible outcomes, understanding the likelihood of litigation, and establishing timetable and budget

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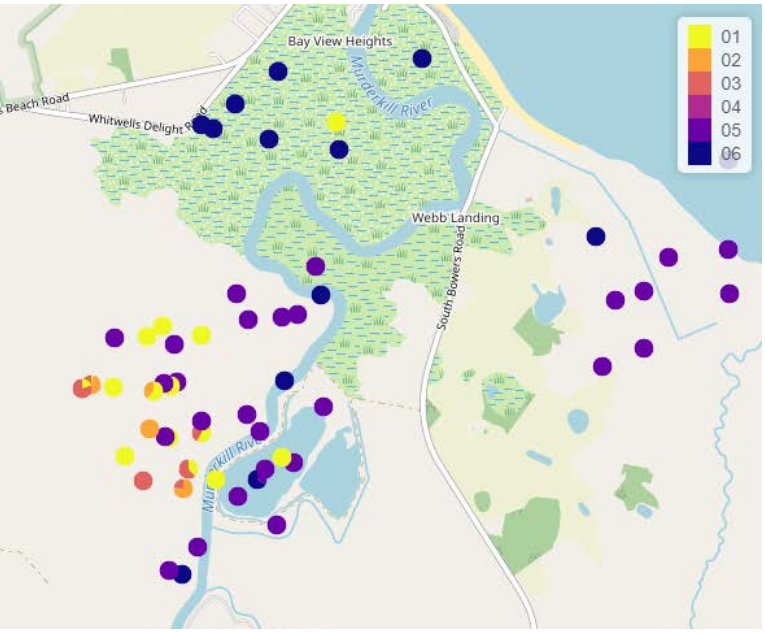
OUR SERVICES



Historical Reconstruction and Pathway Analysis

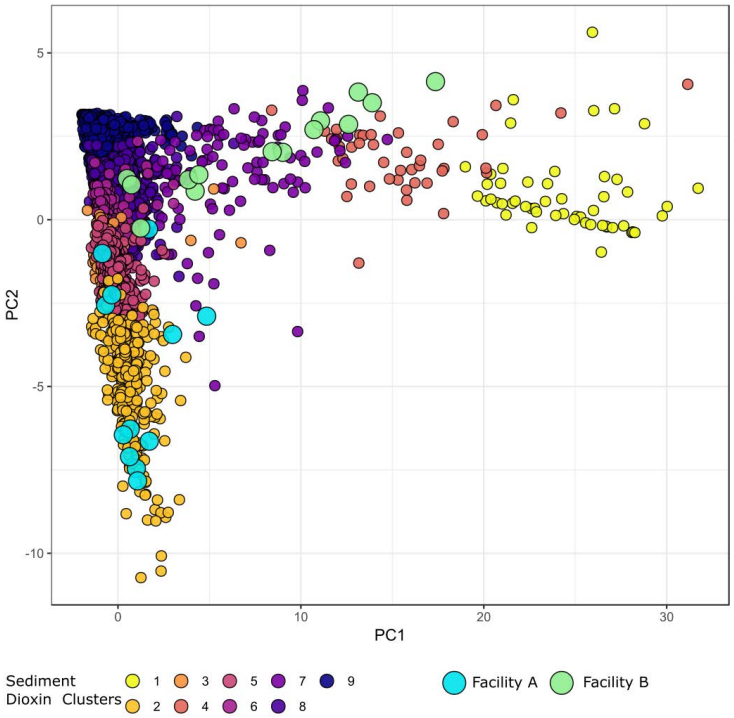
Pathway analysis and historical reconstruction are critical lines of evidence that are often overlooked in a forensics evaluation. TIG Environmental uses pathway analysis to explore transport between sources and receptors, and we leverage our firm's best-in-class investigative capabilities to reconstruct historical operations, including transport pathways and documented releases. Our approach to historical reconstruction and pathway analysis includes:

- Hydrodynamic and sediment transport evaluations including TIGSED
- Integration of groundwater flow and air dispersion modeling into the forensic analysis
- Proprietary data analytics tools (TIGeR) to screen and triage large document productions
- Best-in-class investigative and historical document review expertise

Source Unmixing

Certain situations may require scaling forensic analysis to more complex methods such as receptor modeling or source unmixing. Source unmixing methods help differentiate contaminant sources, including the number, pattern (fingerprint), and contribution of unique contaminant profiles within individual samples. Source unmixing is particularly useful for understanding complex sites with numerous source types and for allocation of contributions between parties. Examples of our unmixing tools include:

- Proprietary implementations of state-of-the-art receptor models (polytopic vector analysis [PVA] and non-negative matrix factorization [NMF/PMF])
- Tools for model validation and the identification of anomalies that can identify important features or outliers in the data



OUR EXPERIENCE

Alleged Dioxin Emissions from an Industrial Facility

Problem: An industrial facility is defending itself from multiple lawsuits in which the plaintiffs allege dioxin emissions from the facility have contributed to the development of cancers. Multiple active plaintiffs and lawsuits are associated with this facility.

Solution: TIG Environmental's scientists conducted a detailed forensic investigation of dioxins in environmental samples and compared the dioxin profiles to likely dioxin sources. The results of the investigation indicate that emissions from the client's facility have no discernable contribution to the dioxins measured in the vicinity of the facility and identify other sources and likely contributors. TIG Environmental's scientists have prepared expert reports, trial exhibits, and expert testimony to support the litigation.

Value Added: TIG Environmental's expert reports and expert testimony are helping the client negotiate favorable settlements with some plaintiffs and mount a vigorous defense in court cases associated with other plaintiffs.

Complex Multi-PRP Sediment Sites

Problem: Legacy contamination in large urban waterbodies often drive expensive investigation and cleanup. These sites often have numerous (tens to over a hundred) different potentially responsible parties (PRPs) that may be responsible for discharges over many decades. Untangling the contributions from different parties is complex and requires careful statistical analysis using state-of-the-art data analysis methods that use multiple lines of evidence.

Solution: TIG Environmental is conducting a detailed investigation of chemical data in sediments and upland areas using multivariate forensics analysis, combined with detailed review of historical information. The document review is focused on the various sites, process chemistry, waste handling procedures and spill records, and other lines of evidence. TIG Environmental's scientists have published a detailed chemical forensic analysis that demonstrates that, in contrast to previous findings suggesting a single dominant PRP, multiple PRPs are significant contributors. The forensic investigation is based on a scaled approach in which multiple lines of evidence ranging from simple analyses of concentration gradients to the multivariate data analysis methods such as principal component analysis (PCA) and hierarchical cluster analysis (HCA) and statistical unmixing and receptor modeling, are integrated into the analysis.

Value Added: The results are being used to support the client in obtaining a more equitable allocation of investigation, design, and remediation costs. The potential savings to the client could be in the hundreds of millions of dollars.

Groundwater PFAS Contamination with Multiple Sources

Problem: Groundwater PFAS contamination was found in the vicinity of a coatings facility. A large-scale sampling program identified large-scale PFAS contamination in residential wells. Regulators attributed this contamination to the coatings facility and pushed the owner to develop and pay for a comprehensive response including water treatment systems and expanding service of town water to affected properties. Although other potential sources of PFAS were known to exist, these other facilities were not being ordered to support the investigation or response.

Solution: TIG Environmental's scientists are working with other consultants to investigate other possible sources. This investigation is ongoing and includes a detailed forensic investigation of groundwater PFAS and sources and an evaluation of transport pathways and site histories. The results of the investigation are being used to delineate facility sources and differentiate these other local sources.

Value Added: The results are being used to support the client in obtaining a more equitable sharing of investigation, design, and response costs. The potential savings to the client could be in the millions of dollars.

PCB Forensics at a Major Superfund Site

Problem: As part of the allocation at a major Superfund site on a river system, our client, as manager of the river sediment, was potentially responsible for PCB and PAH sediment contamination in a portion of the river that had previously been remediated and had no evident PRPs.

Solution: TIG Environmental conducted chemical forensic analysis of sediment samples within the area and compared them to known PCB Aroclors standards and various petroleum-related product signatures. This chemical analysis was combined with historical research of the previous operations and contamination associated with those operations to connect contaminant signatures seen in the sediment with known historical operations and operators.

Value Added: TIG Environmental was able to identify multiple chemical signatures in the sediment that were consistent with specific upland operations and the insufficiency of the previous remediation of sediments, providing our client with identification of PRPs that have some liability for the sediment contamination.

Visit our website for more information:

TODAY'S TOOLS FOR
TODAY'S CHALLENGES

TIG ENVIRONMENTAL SERVICES

Contaminated Sediment Management

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Liability and Allocation

PFAS Liability

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