



CONTAMINATED SEDIMENT MANAGEMENT

The world of contaminated sediment management is changing fast. Waterfront revitalization is driving the need to address legacy sediment contamination in urban areas. Regulatory agencies and the communities they serve are demanding more rigorous cleanups with features that can dramatically drive up complexity and cost. At the same time, there is increasing pressure for source identification and control. With the cost of some cleanups well into the billions of dollars, cost allocation has transformed into an intricate, high-stakes enterprise. Now more than ever, entities involved in contaminated sediment management need advice from accomplished, veteran practitioners who can speak to the issues with steady, expert guidance. TIG Environmental offers exactly this. Whether you need a few days of strategic consultation, support in allocation or litigation, or technical studies at any stage of project development, TIG Environmental makes the difference.

Allocation and Cost Recovery Technical Support

Large-scale contaminated sediment cleanups, such as those currently seen in many rivers, harbors, and urban waterways, are extremely expensive. It is reasonable to expect that the parties involved will seek to reduce their anticipated share of the costs. The process of allocation often involves development of technical arguments about the what, where, when and who of legacy sediment contamination. The presentation of these arguments, in the context of allocation or litigation settings, requires a skilled and confident expert. TIG Environmental has senior scientists and engineers who have served in an expert consultant capacity on some of the largest sediment cleanup projects in the U.S. and around the world. We are credible and highly effective participants in dispute resolution settings of all types. We provide overall technical strategy to expert testimony and everything in between.

Site Investigation and Source Identification

Most contaminated sediment sites are well into the cycle of exploration and testing. Often there are stacks of reports presenting analytical chemistry data and model results but no overall interpretation of meaning. TIG Environmental can use the available information to synthesize overall meaning out of the data chaos. Our skills range from reconstructing industrial histories to pinpointing sources and pathways of contamination to the sediments. We will develop a meaningful conceptual model of your site that will allow you to identify and fill data gaps as well as strategize for allocation, cleanup, or both.

Forensic Studies and Modeling

Sources of sediment contamination are difficult to untangle. TIG Environmental uses a variety of sophisticated statistical, chemometric, isotopic, and computer modeling tools to establish otherwise hidden source characteristics and provide answers to questions such as: Where did this contamination come from? When was it deposited? What can we do to clean it up? How much will it cost? Informed decision making begins with a good foundation of understanding of the nature of the problem.

Data Analytics and Visualization

The best information is nothing if it cannot be understood. TIG Environmental understands that developing reports relying solely on written explanations would limit our ability to communicate our expert opinions. Instead, we make an impact through unique data visualization tools, infographics, and presentations. We can host platforms for an individual site or an entire river or harbor. We tailor our work products to the audience, be it a highly technical convening of experts or a public workshop on the site. We manage databases with millions of entries securely and efficiently. We routinely use our in-house technical editors to ensure our written work is concise and well understood.



Remedial Design and Construction Support

The transition from investigation and cost allocation to remedial design and construction is where experienced scientists or engineers can have a substantial effect on the cost, constructability, and long-term success of the chosen remedy. TIG Environmental has experience in the application of the available technologies in multiple settings. We can assist in all phases from strategy development to conceptual design, contractor prequalification, and construction observation. Using our team's knowledge base and expertise in strategy development, we can demystify the concepts of adaptive management, beneficial reuse, sustainability, and circular economy. Through clear communication, we can assist with community outreach and engagement programs. TIG Environmental can create community-accessible dashboards to provide more near- to real-time access to remedial action monitoring data.

OUR EXPERIENCE

Site Investigation and Source Identification

Problem: Faced with a regulatory order to clean up a contaminated sediment site upstream of another cleanup site in a major river, our client commissioned TIG Environmental to evaluate the existing data, consider historical and ongoing sources, model the potential for recontamination, make recommendations for study, and prepare preliminary concepts for cleanup.

Solution: TIG Environmental reviewed existing data that had been collected by other parties and identified constituents of concern. We also evaluated the upland area draining to the river and identified several potential sources of contamination to the river. Additionally, we employed hydrodynamic/particle transport modeling to evaluate the potential for sediments to recontaminate other areas of the river. We provided recommendations for additional studies to fill data gaps and prepare for full evaluation of the site.

Value Added: When faced with large uncertainties surrounding a complex and potentially high-cost environmental liability, TIG Environmental was able to rapidly deploy resources and reduce the scientific and engineering uncertainties, as well as identify other potentially responsible parties (PRPs) for possible cost recovery actions in the future.



Data Analytics and Visualization

Problem: TIG Environmental has clients that are PRPs in allocations at major Superfund river systems or mega-sites that require an understanding of contamination and their potential responsibility for these contaminants. However, investigations of these major Superfund river systems or mega-sites usually occurs over multiple decades and typically at different times in different segments of the investigation area. This can result in millions of analytical results that can be difficult for our clients to access and evaluate.

Solution: We have developed custom data viewers that can readily handle the millions of analytical results generated in these systems and present TIG Environmental-developed data analytics that are tailored to the specific site and the specific needs of the client. These data analytics can include interactive maps of sediment contamination and statistical plots of analytical results that respond to real-time filtering and focused analysis.

Value Added: These viewers allow TIG Environmental to answer client questions about a site in real-time during meetings with the client and other outside parties such as regulators or allocators. In addition, these viewers allow the client to interface directly with the data to refine questions and assessments.



Forensic Studies and Modeling

Problem: As part of the allocation at a major Superfund river system, our client, as manager of the river sediment, was potentially responsible for polychlorinated biphenyl (PCB) and polycyclic aromatic hydrocarbon (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.



OUR EXPERIENCE



Allocation and Cost Recovery Technical Support

Problem: A private owner of a property located on a portion of a 5-mile long industrial waterway Superfund Site was invited to participate among more than 40 parties in the allocation process. The property, contaminated by legacy operations, is located between several major known source areas of PCBs. Sediments adjacent to the property exhibited concentrations of PCBs exceeding remedial action levels. The proposed remedy for this area, monitored natural recovery, was a technology incompatible with current and future long-term use of the property's in-water infrastructure. The property owner was confronted with potential liability for cleanup of PCBs in sediment from multiple potential sources of contamination as well as a proposed remedial action that could shutter the business.

Solution: Working with the property owner's attorney, TIG Environmental collected and analyzed PCB concentrations in sediment, surface soil, and catch basin solid samples, and evaluated PCB signatures from potential on- and off-property sources. Using a sediment transport model, we were able to quantify PCBs depositing into sediments adjacent to the property from other in-water sources and developed a quantitative allocation methodology. We also developed an engineering cost estimate for active remediation to address contamination while accounting for current and future land use.

Value Added: TIG Environmental applied an allocation strategy using multiple lines of evidence to quantify an allocable share to all parties for contamination near the client's property, thereby potentially reducing the client's liabilities for cleanup costs. The remedial technology assigned to sediments adjacent to the property have been formally recognized by the U.S. Environmental Protection Agency (EPA) as incompatible with long-term use of the site and is being reassessed following pre-design investigation studies.

Remedial Design and Construction Support

Problem: For a contaminated intertidal channel in a highly urbanized area within San Francisco Bay, TIG Environmental is assisting the PRP group with pre-remedial design studies. EPA proposed a time-critical removal action for removal of more than 20,000 cubic yards of contaminated sediment.

Solution: TIG Environmental and a design team with engineers and scientists from multiple specialist firms helped its client achieve agreement with EPA to apply a risk-based multi-technology remedial approach. We are now conducting pre-remedial design studies that include specialized evaluations of sedimentation rates, depth of the biologically active zone, bulk sediment and pore water chemistry, erosion and particle transport, and geotechnical parameters. Overall, the studies will support the design for dredging, capping, and monitored natural recovery of the contaminated sediments.

Value Added: EPA's original proposal focused solely on removal of contaminated sediments, which would have been costly. TIG Environmental was able to utilize our expertise at sediment cleanup sites to demonstrate the effectiveness of a risk-based approach. This alternative approach will result in significant reduction in removal volume and overall project cost.



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TODAY'S TOOLS FOR TODAY'S CHALLENGES

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Contaminated Sediment Management

Data Analytics and Visualization

Engineering and Remedial

Environmental Forensics

Liability and Allocation

PFAS Liability

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