

Contaminated Sediments Assessment & Management

Overview

Exponent has more than 40 years of experience providing technical support to industry and government in the assessment and management of contaminated sediment. We have worked on major contaminated sediment sites nationwide, including marine, estuarine, riverine, and large and small lacustrine systems. Exponent is an active sponsor of the Sediment Management Work Group (SMWG) and has also contributed to national and international panels charged with identifying how best to evaluate and manage sediments.

Our sediment assessment and management services include:

- » Human health and ecological risk assessment
- » Natural resource damage assessment (NRDA)
- » Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Oil Pollution Act (OPA) consulting
- » Design and oversight of field investigations
- » Data management and spatial analysis, including geographic information systems (GIS)
- » Contaminant transport and fate, sediment transport analyses
- » Bioavailability and bioaccumulation studies
- » Sediment toxicity studies and sediment quality triad assessments
- » Environmental forensics investigations
- » Management of natural resource damage liability
- » Remedial alternative analysis (including natural attenuation) and feasibility studies
- » Regulatory strategy development
- » Remediation and restoration planning and oversight
- » Constructed treatment wetlands design
- » Ecosystem impact and recovery monitoring

Exponent's team of aquatic/marine toxicologists, risk assessors, geochemists, and engineers strive to pursue environmentally protective and cost-sensitive solutions to contaminated sediment problems. Such solutions rest on fundamental scientifically based principles that govern the extent to which humans and wildlife come into contact with and are affected by contaminants.

Exposure and Toxicity Assessment

The environmental fate of contaminants must be understood in order to predict potential impacts on human health and ecosystems. Exponent has extensive experience understanding how contaminants enter water bodies, the geochemical processes that govern their bioavailability, and how they are transformed by biological, geological, and chemical processes over time. Exponent scientists design and oversee sampling and analysis programs to identify whether and to what extent various key effects may be occurring and the source of environmental risks. These data are used in a risk management setting in concert with industry and regulators to determine whether remediation is appropriate and identify the optimal courses of action. In a litigation setting, field studies may also include an important environmental forensics component, which can help allocate liability among various sources.



Risk posed by sediment-associated chemicals to aquatic organisms is best understood through an evaluation of three metrics of sediment quality, known as the Sediment Quality Triad: sediment chemistry, toxicity, and benthic community. Measurements of these three areas are integrated to reach conclusions based on the degree of risk indicated by each measurement and the confidence in each measurement. Exponent ecologists and toxicologists have extensive experience in applying the Sediment Quality Triad approach to sediments containing metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and pesticides. Our scientists have specific expertise in cost-effective study design, including selecting appropriate test methods, interpreting results of Sediment Quality Triad studies, and developing technically defensible cleanup goals to support remedial decisions.

Assessing the toxicity of the complex mixture of contaminants that can be present in sediment can be a challenging undertaking. For example, individual compounds in oil vary in potency and modes of toxic action, and the influence of weathering changes the composition and toxicity of the mixture. Exponent toxicologists bring to bear the latest technical approaches to understand and predict the toxicity of individual sediment contaminants and complex mixtures to ecological receptors, and to develop site-specific sediment quality guidelines and cleanup levels.

Use of Environmental Forensics

Complex cases involving contaminant releases into urban estuaries or multifaceted industrial settings depend on a strong scientific approach to reconstruct the release and assess risk, or in the case of NRDA, assess injury, establish causation, and define baseline. Exponent excels in this arena, and our clients rely on our combined experience in ecological risk assessment and biological injury assessment, along with our knowledge of contaminant transport pathways and chemical forensics, to help allocate risks or injuries to various sources. Exponent brings experience in multiparty sites involving PCBs, PAHs, dioxins/furans, and metals to our clients' most difficult sediment contamination problems.



Risk-Based Cleanup Alternatives

Exponent toxicologists and ecologists perform site-specific analyses to support the establishment of realistic cleanup goals, and to provide comparisons of short-term and long-term human health and ecological risks for different remedial scenarios. By integrating the expertise of engineers, bioavailability chemists, toxicologists, and ecologists, Exponent provides sound, scientifically based assessments for selection of cost-effective remedial actions that are protective of human health and the environment. Our contaminated sediment management strategy is to minimize contaminant risks to the environment and human health while also minimizing cleanup costs.