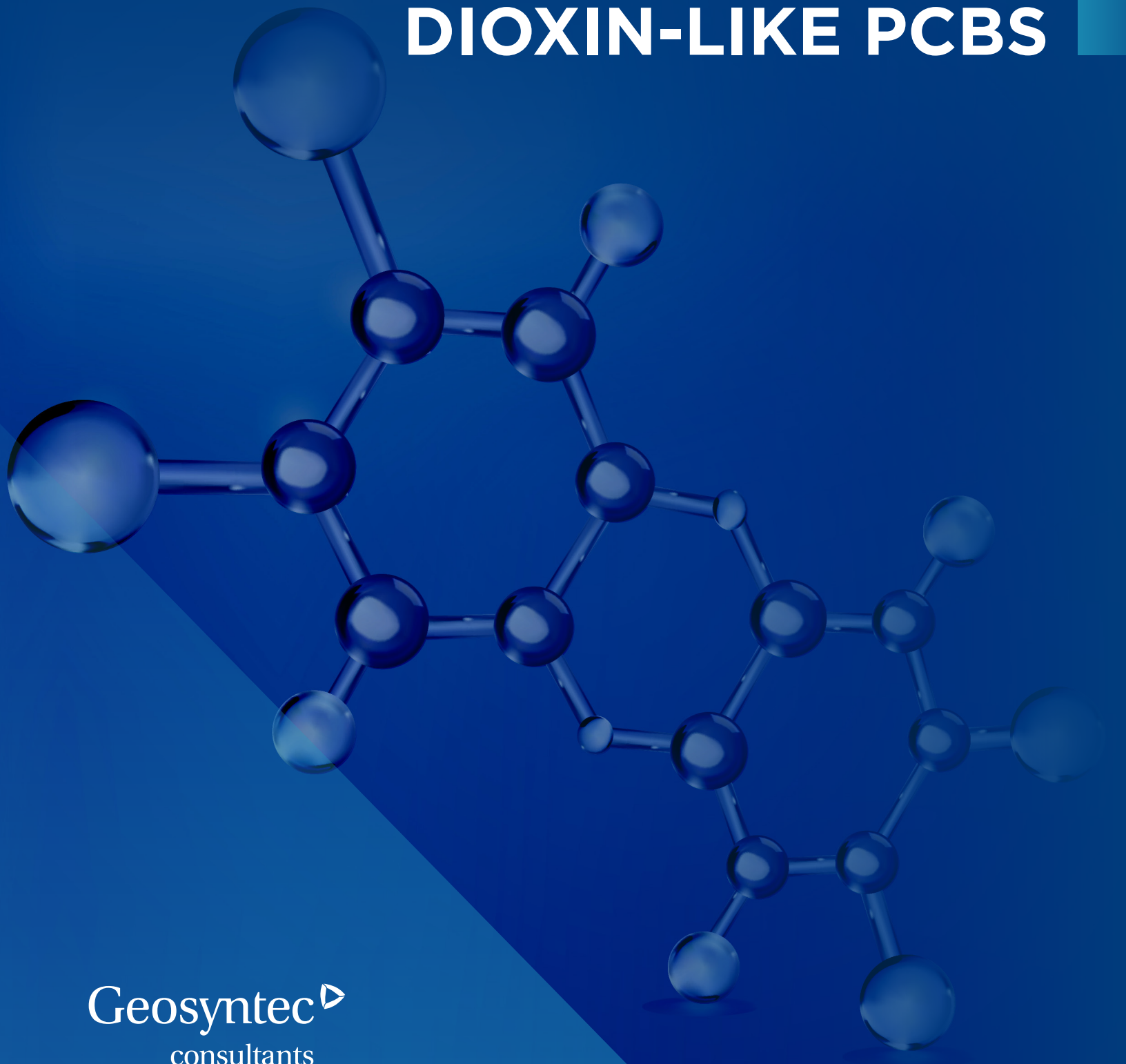
STATEMENT OF QUALIFICATIONS

DIOXINS, FURANS, AND DIOXIN-LIKE PCBS



Geosyntec consultants



GEOSYNTEC OVERVIEW

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Geosyntec is a consulting and engineering firm that works with private- and public-sector clients to address new ventures and complex problems confronting our environment, natural resource, energy, and civil infrastructure. We serve clients from more than 130 offices in the United States, Canada, the United Kingdom, Ireland, Sweden, Spain, Finland, the United Arab Emirates, Saudi Arabia, and Australia. With more than 2,800 scientists, engineers, and other professionals from around the globe, we work each day to forge an inclusive and equitable environment for all our employees, clients, partners, and for the communities we serve.

RISK ASSESSMENT AND TOXICOLOGY

Geosyntec's risk assessment and toxicology action group, which has over 200 practitioners, includes experts in the fields of toxicology, risk assessment, and public health. Our core focus in applied toxicology and ecotoxicology is supported by specialists in complementary fields like statistics, air dispersion and deposition modeling, biotrophic feed web modeling, vapor intrusion, industrial health and safety, and consumer product stewardship. We deliver human health and ecological risk assessment services that identify best-value approaches to evaluate the implications for exposure and liability and remediate contaminated sites. Our risk assessment specialists work alongside our technology leaders, remediation practitioners, and internal and external counsels developing site-specific, pragmatic solutions. We characterize risk and tailor our approach to meet our client's goals for compliance, financial management, and environmental stewardship. We also provide expert consultation and testimony on environmental, worker, and consumer exposure issues for our legal clients. Our practitioners are experts in addressing allocation and complex issues associated with multiparty and high-profile sites and integrating remediation and redevelopment plans with sensitive land use designs, such as residential neighborhoods, schools, recreational facilities, or sensitive wildlife habitats.



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CHALLENGES OF DIOXINS, FURANS, AND DIOXIN-LIKE POLYCHLORINATED BIPHENYLS (PCBS)

Chlorinated dioxins and furans are toxic environmental pollutants that are produced unintentionally as byproducts of high-temperature industrial and municipal processes. These compounds can also form naturally in events like wildfires and volcanic activity. Despite their unintentional origins, they persist in the environment, accumulate in the food chain, and pose serious health risks.

Dioxins and furans form when organic matter, chlorine, and heat interact under the right conditions. Industrial activities known to produce these compounds include incineration, coal combustion, paper milling, and pesticide manufacturing, among others. Because they result from uncontrolled processes, they are often found alongside other hazardous substances, such as polycyclic aromatic hydrocarbons (PAHs), heavy metals (e.g., lead, mercury, chromium, cadmium), and other inorganics.







As persistent organic pollutants (POPs), dioxins and furans accumulate in fatty tissues, leading to long-term environmental and human health concerns. Short-term exposure may cause skin lesions, while chronic exposure is linked to cancer, hormonal disruptions, neurological effects, and immune system impairments. Due to their ability to bioaccumulate and biomagnify, even low environmental concentrations can lead to significant health risks.

While dioxins and furans are unintended byproducts, polychlorinated biphenyls (PCBs) were intentionally manufactured for decades before their production was banned in most countries. Used in electrical insulation, hydraulic fluids, and industrial coatings, PCBs became widespread contaminants in soil, sediments, and water bodies. A subset of PCBs, known as dioxin-like PCBs, shares structural similarities and toxicological properties with dioxins and furans. Consequently, these PCBs are often assessed alongside dioxins in environmental investigations.

Determining the source of dioxins and furans at a site can be complex, as multiple sources may contribute to contamination, including background pollution from urban and rural activities. Risk assessments typically evaluate these compounds as a mixture, recognizing their combined toxic effects. Understanding the sources, fate, and toxicology of dioxins, furans, and dioxin-like PCBs is essential for effective risk management and remediation strategies.

Dioxins, furans, and dioxin-like PCBs represent a significant challenge in environmental contamination and public health. Their persistence, bioaccumulation, and toxicity necessitate rigorous monitoring, source identification, and mitigation efforts to minimize exposure risks and protect both ecosystems and human health.



DIOXIN AND RELATED COMPOUND **PROJECT HIGHLIGHTS**

We are experts in supporting risk management decision-making at sites impacted by dioxins, furans, and dioxin-like PCBs. We help clients navigate tricky risk communication, advocate for fairly allocated site cleanup costs among multiple stakeholders and multiple release histories, and gain regulator acceptance for innovative and effective site remedies.

COMPREHENSIVE REMEDIAL DESIGN OF THE GOWANUS CANAL SUPERFUND SITE

BROOKLYN, NEW YORK

- Reviewed the human health and ecological risk assessments underpinning the remedial investigation and feasibility study of the site, which informed the remedial design.
- Evaluated the carcinogenic risk and noncarcinogenic hazard of compounds by identifying data gaps and assessing statistics.
- Used critical reassessment of naturally occurring, natural and human-caused background conditions, and an assessment of sensitive subpopulation scenarios as receptors of concern, to refine applied toxicology and health-based criteria used in the remediation scheme.
- Developed a unique quantitative risk model to direct health-mediated allocation and assign remediation costs and among all stakeholders, refining risk-driven decision criteria and mapping preferred strategies.

ASSESSMENT OF NURSING INFANT EXPOSURES TO DIOXIN-LIKE PCBS

COLUMBIA RIVER, OREGON

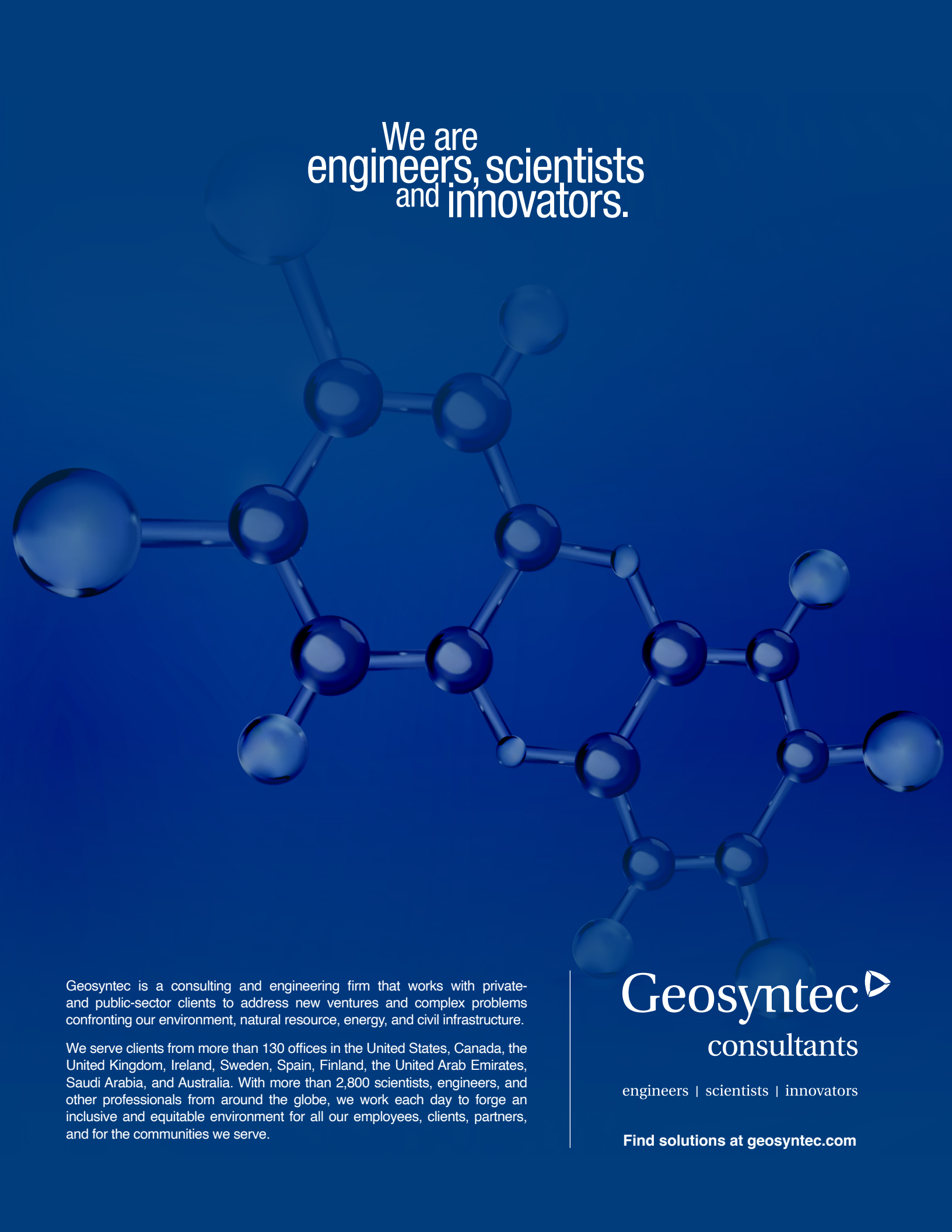
- Helped resolve a seemingly intractable position with Oregon Department of Environmental Quality regarding PCB (and dioxin-like PCB) contamination of the Columbia River.
- Used novel toxicology and risk assessment techniques to refine the understanding of specific congener and dioxin-like congener impacts to a Native American subsistence fishing population where nursing infants were considered the critical receptor.
- Avoided dredging the river and bay sediment, saving the client millions of dollars. In addition, our effective risk communication with local stakeholders dramatically relaxed community tension and relations.



QUANTITATIVE EXPOSURE ASSESSMENT AND PROBABILISTIC SENSITIVITY ANALYSIS

- Assessed human health risks in regards to dioxin-exposure at a large chemical manufacturing plant and associated river ecosystems where manufacturing and past waste disposal practices of chlorine-based products, fugitive emissions, and incineration resulted dioxins and furans, chlorobenzenes, heavy metals, and other byproduct materials being released on- and off-site.
- Developed, in partnership with Tufts University, a quantitative sensitivity analysis that defined the impact of individual exposure and intake parameters for estimating projected cancer risk and developing cleanup criteria. The sensitivity analysis considered routine soil, sediment, groundwater, surface water, and air exposures under agricultural, residential, industrial, and recreational land uses, as well as additional exposure pathways. This assessment was used to support a negotiated settlement.

We are engineers, scientists and innovators.



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