Emerging Contaminants Expertise

Geosyntec consultants
Geosyntec was founded in 1983 as a specialized consulting and engineering firm that works with private and public sector clients to address their new ventures and complex problems involving the environment, our natural resources, and our civil infrastructure. Geosyntec has more than 1,200 engineers, scientists, and related technical and project support staff located in more than 80 offices throughout the United States and in Canada, Australia, and the United Kingdom.

We are nationally known for our technology leadership, broad experience, and exceptional client service. Our professionals continue to develop new technology applications and practice capabilities. Our applied research partnerships with leading universities, NASA, U.S. EPA, Department of Defense, and other organization are producing better methods for the in situ remediation of recalcitrant chemicals in the environment; management of urban watersheds to reduce pollutant loadings; protection of endangered species from the impacts of storm water runoff; design of industrial and municipal waste disposal facilities; and geotechnical and seismic analysis and design of earthen structures and other critical facilities.

Our private sector clients come from a variety of industrial sectors including mining, oil and gas, chemical, aerospace, pharmaceutical, diversified manufacturing, advanced technology, power and utility, real estate, law, and environmental management. Our public sector clients include municipal, state/regional, and national governments.
Our Services

Geosyntec provides comprehensive services at sites with emerging contaminants through all phases of a project life cycle. We have supported numerous investigation and remediation projects throughout the world and continue to provide cost-effective, innovative remediation solutions that balance client objectives with those of the regulatory agencies and other stakeholders.

Emerging Contaminants Expertise

- Per- and Polyfluoroalkyl Substances (PFAS)
- 1,4 Dioxane
- 1,2,3-Trichloropropane (TCP)
- Chromium
- Pharmaceuticals and Personal Care Products (PPCPs) and other Endocrine Disrupting Compounds (EDCs)

Services

- Site Investigation, Characterization, and Conceptual Site Model Development
- Innovative Remedial Solutions
- Toxicology and Risk Assessment
- Regulatory Advocacy
- Environmental Management and Litigation Support
Site Investigation, Characterization, and Conceptual Site Model Development

It is vital to properly investigate and characterize source and downgradient impacts, as well as to assess potential receptors and exposure pathways. The diffuse nature of emerging contaminants and the presence of many other COCs with low concentrations means that, without a strategic, coordinated plan, clients risk years of expensive sampling with no ability to discern a pattern in the results.

Innovative Remedial Solutions

Geosyntec has conducted numerous laboratory treatability studies and/or full-scale field implementations of remedial technologies for contaminated soil and groundwater, including:

- In situ bioremediation (ISBR),
- In situ chemical reduction (ISCR) using novel zero-valent reductants, and
- In situ chemical oxidation (ISCO) using a variety of oxidant formulations.

Toxicology and Risk Assessment

We provide specialized applied toxicology services to address a variety of health issues and ecological concerns related to exposure to emerging contaminants in water, soil, and soil vapor.

Regulatory Advocacy

Our scientific credibility, decades of positive relationships with regulators, and solid analytical data from well-designed studies continue to gain regulatory approval for our ongoing work at emerging contaminant-impacted sites.

Environmental Management and Litigation Support

We help our clients manage risk, maintain environmental compliance and reduce environmental liabilities. Geosyntec also routinely provides expert witness and litigation support, including cost allocation and remedial cost estimation, forensic investigations and source identification, and the interpretation of sound data when it comes to questions about liability for contamination and/or exposure. Our experts are knowledgeable about the legal ramifications of a wide variety of topics related to emerging contaminants.
Value-Added Solutions

Leading the Way through Applied Research
Geosyntec scientists and engineers have pioneered the use of technologies that profoundly refashioned remediation practices: bioaugmentation, vapor intrusion assessment tools, and more. We actively lead applied research and development projects funded by the Army, Navy, Air Force, DOE, SERDP, and ESTCP. We also provide intramural seed funding to internally develop new ideas. Partnerships are established with leading university researchers to develop and test practical solutions for emerging contaminants. We also collaborate with technology vendors and analytical laboratories to advance the state-of-the-practice, thereby developing innovative and commercially-available methods, tools, and technologies that are client-ready.

Designing Innovative Technology Solutions
Geosyntec has developed and used several commercialized remediation technologies that target recalcitrant and persistent compounds. One example involves the application of electrokinetic-enhanced amendment delivery methods have been used in combination with thermally-activated persulfate to remediate 1,4-dioxane and other emerging contaminants in silts and clays. Geosyntec is a preferred partner for creative, cost-effective and successful solutions because we approach each remediation project with technical understanding, creativity, and client focus.

Advocacy, Risk Management, and Legal Services
Our professionals have successfully developed and implemented risk-based solutions for emerging contaminants while meeting client and other stakeholder objectives. We are committed to finding cooperative solutions even before regulations are established. Our scientific credibility, presentation of data from well-designed studies, and decades of positive relationships with regulators continue to result in regulatory approval.

We also provide clients with a diverse portfolio of services to manage risk, maintain compliance, improve financial performance, and reduce environmental liabilities. We assist clients nationwide with large-scale transactional due diligence, compliance reviews, and regulatory issue notification and resolution. Geosyntec routinely provides testifying and non-testifying expert witness and litigation support for our clients on a variety of topics related to emerging contaminants.
Passive Treatment of 1,4-Dioxane Using Phytoremediation
At a site in Florida, elevated concentrations of 1,4-dioxane were migrating towards the property boundary. Geosyntec replaced a costly pump-and-treat system that was unable to impact the downgradient plume with a low-maintenance engineered phytoremediation (TreeWell®) system. The trees efficiently reduced 1,4-dioxane and other co-contaminant concentrations in groundwater through transpiration and photo-oxidation, and provided a low-cost management solution. Plume concentrations have been reduced by up to two orders of magnitude.

Multi-Component Groundwater Remedy for 1,4-Dioxane
At a Colorado site, total concentrations of chlorinated solvents (up to 30,000 parts per billion) and 1,4-dioxane were present in the source area and plume in weathered bedrock up to 40 feet deep. Geosyntec designed and implemented an innovative, multi-component remedy involving hydraulic containment, bioremediation, monitored natural attenuation (MNA), and vapor mitigation, all in the context of a long-term site management strategy. The combination of hydraulic containment and bioremediation injections has effectively reduced contaminant concentrations by up to 99%.

Zero-Valent Zinc (ZVZ) Remediation of 1,2,3-Trichloropropane
With funding from the Navy Environmental Sustainability Development to Integration (NESDI) program, Geosyntec designed and tested an innovative approach for in situ remediation of 1,2,3-trichloropropane (1,2,3-TCP) using zero-valent zinc (ZVZ). The bench-scale system achieved 95% degradation of 1,2,3-TCP after just 12 weeks of operation and provided a basis for taking the technology into the field. Pilot-scale ZVZ injections successfully reduced 1,2,3-TCP concentrations within the injection area and downgradient, with insignificant residual zinc or other secondary water quality impacts. With funding from ESTCP, Geosyntec is currently evaluating the long-term efficacy of ZVZ injection and achievable subsurface distributions using 1,2,3-TCP technologies. In addition, Geosyntec will be starting additional studies at two areas at Camp Pendleton in late 2017 to evaluate the effectiveness of source zone injections at one area and a permeable reactive barrier approach at another area.

Bioaugmentation at a Former Agricultural Chemical Facility for 1,2,3-TCP
After the completion of site investigations, the state required a remedy to address 1,2,3-TCP and 1,2-dichloropropane (DCP) in groundwater at and downgradient of this California site. Geosyntec conducted a feasibility study to evaluate remedial alternatives and, based on the results, completed a treatability study to evaluate the efficacy of in situ bioremediation (ISBR) as a remedial option for the Site. Results showed that ISBR with bioaugmentation is an effective technology for this site and a removal action work plan was prepared for the implementation. The work plan was approved by the agency and implementation is currently underway. To our knowledge, this work will be the first field implementation of bioaugmentation for remediating 1,2,3TCP.

Development of a Real-Time Measurement Method For PFOS and PFOA
In partnership with Eurofins Eaton Analytical (EEA), Geosyntec is developing a mobile unit that is capable of analyzing PFAS in the field at a fraction of the cost required by a fixed laboratory. The real-time method can be used to investigate many sites where the extent of PFAS contamination is still unknown. This cost-effective, high-resolution approach can be used to quickly develop a solid conceptual site model as a basis for remedial decision-making.
Human Health Risk, Fate, and Chemical Liability Assessment of PFOS in the Upper Mississippi River

Geosyntec staff evaluated human health risks due to bioaccumulation of PFOS in fish in the Upper Mississippi River adjacent to and downstream of the Minneapolis-St. Paul metropolitan area. Investigated chemical fate and potential sources of PFOS in preparation for a potential Total Maximum Daily Load (TMDL) assessment, conducted a liability analysis of current and historical PFOS contributions to the aquatic ecosystem, and conducted NPDES 303(d) permitting calculations and numerous modeling and empirical data evaluations to characterize PFOS fate in the terrestrial and aquatic environment.

Improving Remediation of Hexavalent Chromium, Perchlorate, and Other Co-Contaminants

Geosyntec revamped the remedial strategy at a site with hexavalent chromium (CrVI), perchlorate, volatile organic compounds, and nitrate plumes in groundwater. After evaluating the performance of an on-site pump-and-treat system that provided hydraulic control, Geosyntec optimized the pump-and-treat system operation, and designed and implemented a two-stage in situ biological reduction (ISBR) system for the source area. The system removed 99.7% of perchlorate mass in shallow groundwater and 96% from the deep vadose zone. Shallow groundwater concentrations declined over five orders of magnitude to below cleanup goals.

Novel Treatment of Hexavalent Chromium Using Hydrogen Sulfide Gas

At a former aeronautical manufacturing site, soil impacts included CrVI contamination in the top 45 feet of soil and prevented the sale of the property. Because deeper excavation could not be performed without removal of a building, an in situ gaseous reduction (ISGR) remedy was developed using hydrogen sulfide gas to convert the remaining CrVI impacts to non-toxic chromium oxide. An injection/extraction system was designed and built to inject a stream of H2S gas while simultaneously extracting from a ring of extraction wells to control and treat it. This was the first commercial use of hydrogen sulfide gas for in situ treatment of hexavalent chromium in the vadose zone. Reduction of CrVI was accomplished over an 8 week treatment interval and, based on the post-remediation sampling results, a no-further action determination was issued for the site.

Identifying Illicit Discharges of Endocrine Disrupting Compounds, Pharmaceuticals, and Personal Care Products

More than 200 pharmaceuticals have been detected in surface and/or drinking water to date. Pharmaceuticals are a water quality concern because they can disrupt endocrine systems and aquatic ecosystems. Geosyntec helped large municipalities with a special study to investigate illicit discharge and bacteria sources using novel analytical parameters such as DNA markers. These state-of-the-science forensic tools helped identify pollutant sources, evaluate the cities’ discharge program effectiveness, identify remedial measures, and develop strategies for achieving scientifically-supported regulatory outcomes.
Geosyntec Consultants is a consulting firm with engineers, geologists, environmental scientists, and other technical and project staff based in offices throughout the United States and at select locations in Australia, Canada, Ireland, and the United Kingdom. We address new ventures and complex problems involving our environment, natural resources, and civil infrastructure.

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