

PFAS Solutions

Impact Assessment and Risk Management



Per- and polyfluoroalkyl substances PFAS—a group of man-made chemicals that includes Perfluorooctanoic acid (PFOA), Perfluorooctanesulfonic acid (PFOS), and GenX—have been used by manufacturers and a variety of other industries around the globe since the 1940s according to the US Environmental Protection Agency (USEPA). With persistence and mobility, these chemicals—which don't break down in the environment, affecting the air, soil, and water (including drinking water sources)—have become global pollutants that can pose myriad health and environmental risks.

At Apex, we've been at the forefront of this emerging contaminant of concern. Our clients have turned to us to accurately measure and understand the extent and severity of their PFAS impacts with investigation, characterization, and remediation planning, and stakeholder communication services to reduce their environmental and reputational risks.

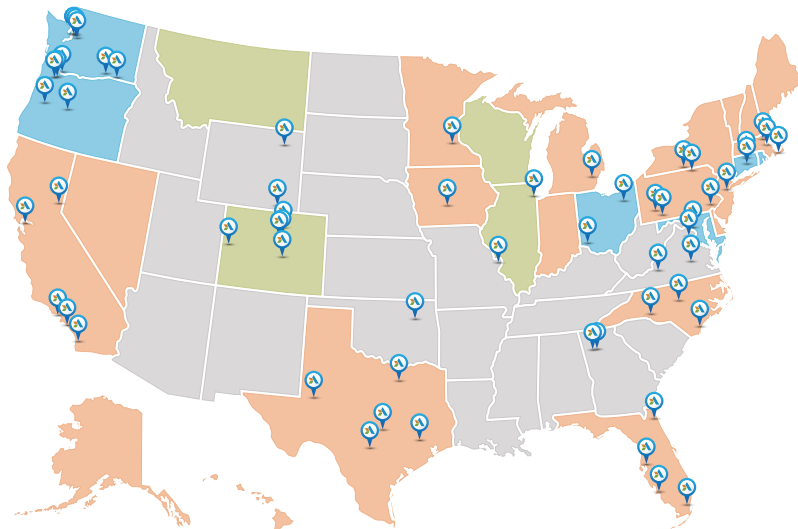
We're committed to environmental excellence.

For over three decades, we've helped clients manage, minimize, and mitigate environmental impacts. From assessing and addressing air, water, and soil quality issues to waste management, risk management, and remediation, we can help you mitigate your environmental challenges and respond to growing concerns regarding PFAS contamination across the United States.

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With over 1,000 professionals across 50 offices, Apex delivers award-winning services nationwide.



National Presence. Local Expertise.

Apex operates in all 50 states and maintains a highly capable and diverse team of scientists, geologists, engineers, technicians, and information management specialists.

Map Legend

- Apex Offices
- Standards for Drinking Water Sources
- Standards for Non-Drinking Water Sources
- Standards Encompassing Multiple Media*

Federal – USEPA – Drinking Water: Health Advisory Level for PFOS and PFOA = 70 ppt; Interim Recommendation Screening Levels for PFOA and PFOS = 40 ppt

Federal – USEPA – Soil: Regional Screening Levels for Residential, Industrial, and Protection of Groundwater

*Multiple media to include drinking water, non-drinking water (groundwater/surface water), and soil/sediment.

Note: States referenced in the Map Legend have formal standards, proposed standards, and/or guidance screening values.

PFAS Services

Our teams are uniquely qualified to reduce your PFOS/PFOA impacts. Our services include:

- Conducting robust QA/QC sampling and analyses programs
- Writing/reviewing sampling procedures and analytical specifications
- Performing comprehensive site investigation for soil, groundwater, surface water, stormwater, and sediment
- Auditing sampling events
- Evaluating and validating laboratory results
- Using ARTEMISSM—our real-time environmental management information system (EMIS)—to capture, pinpoint, and prioritize PFAS data sets

Our approaches are rooted in the latest guidance and regulations. We continually ensure our teams are up-to-date regarding evolving fate and transport research and emerging technologies to minimize environmental and human health concerns.

Why Apex?

Our clients turn to us for our ability to listen to their needs and transform those challenges into results. We achieve those results with a commitment to:

Excellence. Understanding that every client, every project, every site, every regulatory requirement is different—we tailor our approach accordingly. Doing so, we exceed expectations, always striving to set the bar ever higher.

Agility. We pride ourselves on moving quickly without sacrificing quality—combining proven methods with innovative approaches to consistently deliver reliable results—all at a competitive price.

Expertise. Our award-winning teams have been nationally recognized for their dedication and performance.

Simply stated, we can help clients manage and mitigate environmental, health, and safety risks while generating long-term value for future generations.

Representative Projects



PFOS/PFOA Characterization *Fuel Storage and Distribution Facility • Southern California*

Apex planned and implemented investigations to evaluate the presence of PFAS in soil and groundwater at three fuel storage and distribution facilities in Southern California. Work was conducted at two bulk fuel terminals (a 50-acre facility and a 330-acre facility) and at a 5-acre marine fuel terminal.

Apex developed comprehensive work plans and sampling and analysis plans (SAPs) using the latest information and currently accepted practices related to PFAS assessment and evaluation. Soil and water samples were analyzed for approximately 40 different PFAS compounds by laboratories certified for PFAS analysis by the Environmental Laboratory Accreditation Program (ELAP) and Department of Defense ELAP.

Because PFAS are so ubiquitous in the environment, cross contamination from common items such as field clothing, sampling equipment, and sample containers is a significant concern. The SAPs included quality assurance protocol for all aspects of the sampling and analysis of soil and groundwater media samples.

The investigation included sampling of drinking water from faucets and drinking fountains at the main and marine terminals and biased soil and groundwater sampling in the vicinity of former storage locations of aqueous film forming foam (AFFF), fire monitors, fuel tanks, and trucks, as well as systematic sampling to provide comprehensive site data.



Multi-Media Sampling for Fire Training Facilities *Airport • Western US*

Fire training facilities at many airports historically used AFFF, which contained PFAS. On behalf of our airport client and in collaboration with state and local regulatory agencies, Apex is investigating PFAS in soil, groundwater, surface water, stormwater, and sediment in a former fire training facility. Several rounds of assessment have been conducted to determine whether PFAS was present in sampled media and then to define the magnitude and extent of PFAS impacts at the site and downgradient. Samples were collected in accordance with the Apex Standard Operating Procedures (SOP), as well as project-specific sampling and analysis procedures for avoidance of PFAS cross-contamination. Finding elevated concentrations of PFAS in soil and groundwater led to additional investigation activities and monitoring to delineate its extent and may lead to a remediation plan, if necessary. Groundwater in the site vicinity is currently used for irrigation, landscaping, and golf courses.

Since there are no current regulatory standards for PFAS compounds in most states, Apex continuously monitors the regulatory environment in all 50 states. This allows our client to proactively use the most conservative promulgated US standards to assess PFAS impacts for this ongoing project.



Fire Response and PFAS Mitigation *Petroleum Terminal Facility*

Apex provided emergency response activities at our client's bulk storage facility. Fire suppression activities required the use of large quantities of Alcohol Resistant (AR)-AFFF that contained PFOS and PFOA.

Apex's project team performed a site investigation and collected soil samples to determine the extent of PFOS/PFOA surface and subsurface impacts. Approximately 1 million gallons of firefighting run-off (composed of a mixture of AR-AFFF, water, and petroleum products) were collected during the application of the firefighting foam. Our team collected samples of the various separated liquid layers of the collected run-off for laboratory analyses, worked with a hauler and disposal facility for profiling of the collected fluids, and selected and arranged disposal at a suitable waste facility.

Apex oversaw the excavation of PFOS/PFOA-impacted soils and the backfilling with clean imported fill. Excavations occurred at both the access road on top of the tank farm's secondary containment berms and at some locations within the containment berms. Our project engineer assisted the client with evaluating treatment and disposal options of future stormwater that would potentially come in contact with residual PFOS/PFOA at the tank farm. Our team also communicated with the local, publicly owned wastewater treatment (POTW) facility to determine a suitable discharge point into the sanitary sewer system, discharge limitations, and permitting requirements. In addition, we coordinated with the water treatment supplier for the removal of PFOS/PFOA and provided preliminary design services for an effective stormwater treatment system to pre-treat runoff collected from the tank farm prior to off-site discharge.

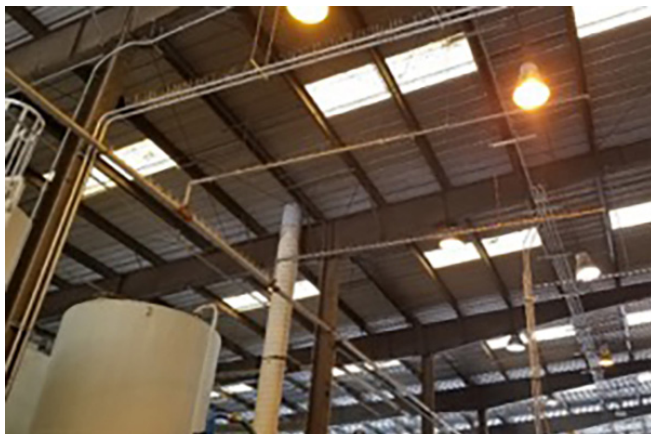


PFAS and 1,4-Dioxane Screening *Brownfield Site • New York City Metro Area*

As part of Apex's overall Brownfield Cleanup Program (BCP) for a large-scale property management firm and developer, we performed a preliminary screening assessment for PFAS and 1,4-Dioxane. PFAS screening was added as a mandatory element of the New York State Department of Environmental Conservation (NYSDEC) BCP to document the absence or presence of PFAS/1,4-Dioxane at all sites managed under the NYSDEC program. To meet NYSDEC requirements, Apex completed the following tasks:

- Scoping PFAS/1,4-Dioxane investigation requirements with NYSDEC to balance program requirements without excessive sampling given the property history that indicated PFAS/1,4-Dioxane should not be constituents of concern
- Modifying work plans and the Quality Assurance Project Plan (QAPP) to detail the investigation scope and procedures including sampling methodologies, analytical methods, and quality assurance/quality control (QA/QC)
- Conducting field sampling of select soil locations and existing monitoring wells as well as laboratory analyses meeting regulatory requirements/low reporting limits
- Interpreting and reporting of results

Our work was coordinated with baseline sampling prior to an Enhanced Reductive Dechlorination remedy which addressed chlorinated solvents in groundwater to reduce costs to the client. We helped the client realize other cost savings by technically justifying that soil sampling for PFAS/1,4-Dioxane should be minimal given no significant PFAS use (other than in incidental materials) and positing that the screening study should focus on groundwater to help NYSDEC develop their regional PFAS database.



Emergency Response Insurance Claim Support *Chemical Fire, PFAS Investigation Claim • Long Island, NY*

Apex was retained by a major insurance company to assist in evaluation of a claim regarding a chemical fire and emergency response action at a chemical storage and distribution facility. This claim involved a fire suppression system (containing PFAS) which was activated, resulting in a PFAS release. Our work included a review of documents related to the fire as well as site restoration following emergency response actions. Two areas related to PFAS required attention: (1) decontamination of structures within the dike system following foam recovery, and (2) evaluation of drywells where fire suppressants were flushed by a local fire department.

Regarding the restoration of the dike and fire suppression systems, we evaluated data from the insured indicating residual impacts and decontamination procedures used to restore the site. Our team also evaluated the recharge costs and procedures and fire marshal clearance of the fire suppression system containing PFAS. Our Apex knowledge of fire suppressants and the functionality of the suppression system enabled us to make recommendations to the insurance carrier regarding the reasonableness and necessity of restoration actions.

The evaluation of drywell impacts posed several challenges for the insurance company and Apex because no fire suppressants should have ever entered the drywell since they were designed to be contained in the dike system. However, the local fire department flushed a significant portion of the suppressants into a local drywell which resulted in PFAS exceeding 9 ppb in drywell bottom sediments and over 1,500 ppb in the drywell liquids. These materials then required special handling. Due to the lack of formal PFAS standards, the applicable regulatory agencies are currently assessing what level of additional investigation or remediation, if any, is required.



PFAS Groundwater Sampling *RCRA Hazardous Waste Facility • Detroit, MI*

In 2018, our client—a Resource Conservation and Recovery Act (RCRA) hazardous waste management facility—received notice from the Michigan Department of Environment, Great Lakes and Energy (EGLE). EGLE requested that our client evaluate PFAS in groundwater as the facility likely handled wastes from plating operations, as well as other potential sources of PFAS. Apex negotiated with EGLE to sample four existing monitoring wells, located at the facility, for PFAS and prepared a workplan which was subsequently approved by EGLE.

We completed the PFAS sampling in October 2019. Analytical results indicate the presence of PFAS in all of the groundwater samples collected. EGLE has published criterion for Groundwater Used as Drinking Water at 70 parts per trillion (ppt). Two groundwater samples contained PFOA, PFOS, or PFOA+PFOS concentrations exceeding 70 ppt.

Currently, we're preparing a report for submittal to EGLE.



PFAS Drinking Water Sampling *Leading Convenience Store • Maryland*

Our client owns approximately 900 convenience stores nationwide. Of those 900 locations, 45 stores use on-site potable wells for their drinking water, food preparation, and for making one of their bestsellers, coffee. Apex was contracted to identify and evaluate locations at risk for PFAS contamination.

Our client has worked with Apex over the past few years to establish ARTEMIS, Apex's EMIS, as a comprehensive, easy-to-use approach to managing their environmental program. Using the GIS tools on our client's dedicated ARTEMIS site, we identified the stores with potable wells within one mile of military installations, which are known to be potential sources of PFAS contamination. We pinpointed four stores, one in Maryland and three in New Jersey.

As their prime environmental consultant in Maryland, Apex was asked to collect drinking water samples, both pre- and post- carbon treatment, to determine if any PFAS impacts existed. No impacts were detected. The client plans to continue to be proactive by using ARTEMIS and partnering with Apex to identify and investigate all potential PFAS impacts at their stores.



PFAS Sampling *Confidential Oil and Gas Client • Colorado*

Apex was contracted to expand our environmental support services with an existing oil and gas client after an oil tank caught fire and was extinguished with firefighting foam containing PFAS. Apex characterized the physical extents and the degree of PFAS contamination. Our team excavated affected areas and collected soil samples to determine the physical extents of contamination. We also collected composite soil samples to determine the degree of contamination. Due to lack of federal and state regulation, we compared analytical data from the clearance samples to background PFAS levels and to Canadian soil regulatory limits for PFAS protective of groundwater. It was determined that due to the industrial land use and lack of potential to affect groundwater sources, the PFAS release posed no significant threat to public health. However, as a best management practice, and because of the uncertainty surrounding future site liabilities, the client opted to dispose of the affected soil. Apex used the waste characterization data to coordinate disposal of the excavated soils at a licensed facility.