Entries for September 16-30, 2026

Market/Commercialization Information

EMERGENCY AND RAPID RESPONSE SERVICES VI (ERRS)

U.S. Environmental Protection Agency, Region 5 Contracting Office, Chicago, IL
Opportunities on SAM.gov 68HE0526R0023, 2026

This is a total small business set-aside under NAICS code 562910. EPA seeks a contractor to support Region 5's ERRS contract. The contractor will provide response support services for emergency, time-critical, non-time-critical removal actions, and remedial actions to mitigate or eliminate any hazard or damage to the environment resulting from a release or threat of release of hazardous substances, oil, and other contaminants or pollutants to the environment. The contractor shall take any actions required to mitigate or eliminate any hazard or damage to human health and the environment resulting from the: release or threat of a release of oil, petroleum products, hazardous substances, pollutants or contaminants into the environment; threat of fire and explosion; incidents involving weapons of mass destruction, nuclear/radioactive biological-chemical threats and/or terrorist acts; and natural or man-made disasters. The contractor shall obtain special services as required by site conditions (through leases, subcontract agreements, or rental agreements, etc.) in a timely and cost-efficient manner, such as specialized removal equipment or personnel with specialized qualifications, as authorized by technical direction. This contract will support the states of IL, IN, MI, MN, WI, and OH. There could be cross-over requirements in other states. The contract will have a five-year base period and an optional six-month period. Responses are due by 5:00 PM EST on November 20, 2026.

https://sam.gov/workspace/contract/opp/272d5491aee449a8a6ebd03c99082691/view

CONSTRUCT INTERIM REMEDIAL ACTION (IRA) FOR THE NELSON TUNNEL SUPERFUND SITE

U.S. Army Corps of Engineers, Engineer Division Northwestern, Omaha District, Omaha, NE
Opportunities on SAM.gov W9128F27RA056, 2026

When this solicitation is released sometime in November 2026, it will be competed as a full and open competition under NAICS code 237990. The U.S. Army Corps of Engineers seeks a contractor to perform an interim remedial action at the Nelson Tunnel/Commodore Waste Rock Superfund Site in Creede, Colorado. The project involves construction services at the Nelson Tunnel/Commodore Waste Rock Site (Nelson Tunnel Site), which includes an abandoned underground hard rock mine and drainage tunnel with multiple shafts, crosscuts, and drifts branching off the main tunnel. The objective of the IRA is to reduce the risk of a large, uncontrolled release of mine-impacted water from pools impounded within the Nelson Tunnel. The selected remedy, identified as Alternative 4 in the Nelson Tunnel Interim Record of Decision, includes driving a new adit to intersect the Nelson Tunnel, rehabilitating the existing tunnel, and installing flow-control structures. The major remedial components are: construct a new bypass adit south of the Nelson Tunnel to bypass the Nelson Tunnel Portal Pool; rehabilitate the Nelson Tunnel from the bypass adit connection to the planned bulkhead location; install a flow-control bulkhead in the Nelson Tunnel to prevent a sudden, uncontrolled release of mine water; and install an accessible bulkhead flow-control structure

in the Commodore 5 level to prevent a sudden, uncontrolled release through that level. There is no solicitation at this time.
Https://sam.gov/workspace/contract/opp/2bb3f13c6474402eb9e3c042a86d4cb9/view

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Cleanup News

PFAS DESTRUCTION AND AIR EMISSIONS DURING FULL-SCALE THERMAL REACTIVATION OF PFAS-LADEN GRANULAR ACTIVATED CARBON FROM INDUSTRIAL SOURCES

DiStefano, R., E. Mayerberger, R. Alward, M. O'Brien, and J. Matthis.
Remediation 37(1):e70093(2026)

A comprehensive testing plan was conducted at a full-scale facility treating PFAS-laden spent carbon from industrial treatment sources to demonstrate the degree of PFAS destruction and to test for the presence of products of incomplete combustion and products of incomplete destruction (PICs/PIDs) in process emissions. U.S. EPA OTM-45, U.S. EPA OTM-50, and U.S. EPA Method 0010/8270 with inclusion of fluorinated PICs/PIDs were used to fully characterize vapor-phase emissions from the reactivation process. Reactivated carbon samples were below the limits of detection for 72 PFAS analytes. The process achieved both destruction and removal efficiency (DRE) and destruction efficiency (DE) of > 99.999% for total analyzed PFAS, with > 99.9999% DRE observed for individual PFAS. Stack emissions were below the detection limits of EPA OTM-50 and EPA Methods 0010/8270, demonstrating the absence of select PICs/PIDs in emissions at standard operating conditions. Findings demonstrate that full-scale thermal reactivation can reliably achieve high levels of PFAS destruction while processing highly loaded spent GAC without the release of undesirable byproducts. Https://onlinelibrary.wiley.com/doi/epdf/10.1002/rem.70093

A NOVEL APPLICATION OF BIOPILE TECHNOLOGY: ADDRESSING PHTHALATE ESTER CONTAMINATION REMEDIATION OF A FORMER CHEMICAL PLANT

Sanfacon, A. and A. Myre. | RemTech 2026: Remediation Technologies Symposium, 14-16 October, Banff, Alberta, Canada, 30 slides, 2026

Biological treatment using biopile technology was used as an alternative to conventional thermal treatment and offsite disposal at a former chemical manufacturing facility with a history of producing resins, plasticizers, polymers, and other industrial products. Lab treatability testing demonstrated the potential for biological degradation of di(2-ethylhexyl) phthalate (DEHP), achieving a 96% concentration reduction in 12 weeks using a 20-kg soil sample amended with horse litter. Subsequent pilot-scale testing of 2,360 metric tons of contaminated soil achieved a 78% reduction in DEHP concentrations after 15 months. During full-scale site remediation, 9,191 metric tons of phthalate-contaminated soil were treated using organic amendments, including wood chips and alfalfa, alongside nitrogen and phosphorus additions to improve soil structure, aeration, and microbial activity. Treatment achieved phthalate concentration reductions of 70-95% after 7-20 weeks, although one soil batch required up to 35 weeks to meet reuse criteria. Approximately 94% of the

phthalate-contaminated soil was successfully biotreated, while the remaining 6% required offsite disposal. The approach also reduced energy consumption by ~8 GWh and saved >$1.4 million compared with the planned thermal treatment, as well as more than $370,000 compared with offsite disposal. Results highlight the importance of appropriate amendment selection, soil segregation, and monitoring of pH, moisture, nutrients, temperature, and biological activity to optimize treatment performance, particularly in clay-rich soil.
Https://esaa.org/wp-content/uploads/2026/10/ALEXANDRA-MYRE.pdf

LESSONS LEARNED - PFAS MASS REMOVAL FROM SOIL, BEDROCK AND ANTHROPOGENIC SURFACES FOR IMPROVED REMEDIATION AND DECONTAMINATION
Ivey, G. | RemTech 2026: Remediation Technologies Symposium, 14-16 October, Banff, Alberta, Canada, 28 slides, 2026

This presentation examines the hydrogeochemical behavior of PFAS and the mechanisms that influence contaminant retention and removal from soil, bedrock, and manufactured surfaces. Emphasis is placed on specialized non-ionic surfactant formulations designed to enhance PFAS desorption, improve penetration into small pores and surface irregularities, and increase contaminant mass transfer into the aqueous phase. Evidence from lab investigations and remediation studies illustrates how surfactant-enhanced extraction can improve PFAS recovery compared with conventional water flushing alone. Applications beyond subsurface remediation are explored, including decontamination of firefighting equipment and other surfaces that may retain PFAS residues. Understanding the interactions between PFAS, treatment solutions, and contaminated materials is essential for selecting appropriate cleaning methods, reducing residual contamination, and minimizing the potential for cross-contamination during field investigations and remediation activities. Lessons learned highlight the importance of considering contaminant partitioning, material characteristics, treatment chemistry, and recovery of PFAS-bearing wash water when designing remediation and decontamination programs. By focusing on contaminant mass removal rather than relying solely on reductions in aqueous concentrations, these approaches offer a potential pathway toward more effective source-zone treatment, improved management of PFAS-contaminated materials, and reduced long-term environmental liability.
Https://esaa.org/wp-content/uploads/2026/10/BUD-IVEY.pdf

APPLICATION OF MULTIPLE INJECTION TECHNIQUES FOR THE REMEDIATION OF CHLORINATED SOLVENTS, PFAS, AND 1,4-DIOXANE IN A COMPLEX GEOLOGICAL SETTING
Mazzarese, M. | RemTech 2026: Remediation Technologies Symposium, 14-16 October, Banff, Alberta, Canada, 23 slides, 2026

A former manufacturing site in the northeastern United States was impacted by CVOCs, PFAS, and 1,4-dioxane in soil and groundwater. TCE concentrations in groundwater exceeded 100,000 µg/L, and contamination extended across more than 4,000 m^2. Remediation was complicated by heterogeneous glacial till, weathered siltstone and shale, and underlying competent bedrock. The remedial approach incorporated a combined treatment technology consisting of zero-valent iron-impregnated granular activated carbon, electron donors, and bacterial cultures to address multiple contaminants. The technology combines adsorption and sequestration with abiotic reduction of chlorinated solvents and

biologically mediated reductive dechlorination. Direct-push technology injections were used to treat the overburden, while pre-drilling and specialized injection techniques were employed to address weathered bedrock and challenging geological conditions. Extensive remedial design characterization, real-time sampling, and targeted injection intervals supported treatment design and implementation. Within 12 months, TCE concentrations in shallow and intermediate groundwater decreased by >99% across 21 monitoring wells and were sustained over 30 months, while concentrations of degradation products continued to decline. After 30 months, average 1,4-dioxane concentrations decreased by 94.5%, while average PFOS and PFOA concentrations decreased by 81% and 78%, respectively.
Https://esaa.org/wp-content/uploads/2026/10/MIKE-MAZZARESE.pdf

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Demonstrations / Feasibility Studies

PILOT-SCALE REMEDIATION, RESOURCE UTILIZATION, AND LONG-TERM STABILIZATION OF CADMIUM, LEAD AND ARSENIC CO-CONTAMINATED SOIL

Liu, J., N. Liu, Y. Li, C. Yang, L. Liang, J. Gao, Y. Xu, and X. Zuo.
Scientific Reports 16:24095(2026)

The remediation efficiency of soil contaminated with complex mixtures of cadmium (Cd), lead (Pb), and arsenic (As) and the feasibility of resource utilization of soil post-remediation were investigated through batch experiments, pilot-scale trials, and engineering applications. In the batch experiments, heavy metals (HMs) were effectively immobilized by the remediation agent, which consisted of a mixture of iron oxides and aluminum oxides. The remediation efficiency was positively linearly correlated with the dose of the remediation agent. A mass ratio of 10% of the remediation agent to soil was determined to be optimal for the solidification and stabilization of HMs. The leaching concentrations of Cd, Pb, and As were reduced from initial concentrations of 517.9 µg/L, 1,123.4 µg/L, and 73.7 µg/L to 85.7 µg/L, 427.5 µg/L, and 26.7 µg/L, respectively, after solidification treatment. The stabilized soil was subsequently utilized for brick fabrication. At a 10% dose and a calcination temperature of 900°C, the resulting bricks exhibited low heavy metal leachability, with Cd and Pb concentrations of only 2.5 µg/L and 3.6 µg/L, while As was not detected. X-ray diffractometer analysis indicated that Pb was effectively incorporated into the feldspar structure, a common and environmentally friendly mineral phase in the Earth's crust. In the pilot-scale trials, results confirmed the effective solidification of heavy metals, with leaching concentrations of Cd, Pb, and As all below 0.1 mg/L. Leachability assessments of the bricks confirmed that HMs were effectively immobilized within mineral crystal structures during high-temperature sintering, while compressive strengths remained consistently high, ranging between 30.6 Mpa and 32.4 Mpa, exceeding the standard requirement of 10 Mpa. Long-term verification was conducted after treatment. After 2.5 years, the concentrations of Cd, Pb, and As in the remediated soil remained significantly below the remediation target values. *This article is **Open Access** at* https://www.nature.com/articles/s41598-026-55113-8?utm

RESPIRATION-COUPLED REDOX METABOLISM SUPPORTS CR(VI) REDUCTION BY AN INDIGENOUS *BACILLUS* IN SOIL-GROUNDWATER

SYSTEMS
Gu, D., X. Cao, D. Wang, D. Chen, J. Yao, and M. Song.
Journal of Hazardous Materials 514:142691(2026)

An indigenous Cr(VI)-reducing strain GS was isolated and evaluated in aqueous batch cultures, soil microcosms, and a pilot-scale in situ trial, supported by multi-omics and microbiome analyses. Strain GS maintained high Cr(VI) reduction across wide temperature and pH ranges in aqueous cultures. In soil microcosms (100-1,000 mg/kg Cr(VI)), strain GS bioaugmentation achieved 66-77% Cr(VI) reduction and shifted chromium from labile pools to more stable solid-phase fractions, indicating effective immobilization. Transcriptomic and metabolomic profiling indicated that Cr(VI) stress activated a respiration-coupled redox response, characterized by enhanced heme/porphyrin metabolism, increased respiration-associated redox activity, and strengthened carbon/redox metabolism. Community analyses identified *Bacillus* as a key taxon associated with Cr(VI) reduction. A 180-day field trial achieved rapid Cr(VI) depletion in soil and groundwater within 30-120 days and showed no rebound over 180 days.

FIELD-SCALE PFAS MOBILIZATION AND RECOVERY DURING STEAM-RANGE IN SITU THERMAL REMEDIATION: PERFORMANCE AND COST IMPLICATIONS
Chen, X., G. Itnyre, J. O. Smith Jr., I. Cowie, and C. Winell. | Remediation 36(4):e70084(2026)

A field-scale treatment of a PFAS-impacted source zone was conducted using sustained steam-range heating (≈80°C-110°C), which was associated with a >98% reduction in total PFAS concentration in the recovered-liquid stream and substantial measured PFAS recovery across a 14,373 m^3 treatment volume. Peak PFAS recovery occurred during the prolonged steam-generation phase, when steam generation and continuous multiphase extraction promoted sustained thermally enhanced mobilization and capture. Over 134 cumulative effective heating days, energy balance analysis showed that ~58% of the utilized thermal energy was associated with steam generation rather than bulk sensible heating. Coupled with a dense and actively managed vapor and liquid extraction network, the phase-change-driven process enabled sustained contaminant mobilization and capture without requiring superheated operation. Point-scale post-treatment monitoring showed sustained concentration reduction at the monitored well, with no apparent rebound over 7 months. Results show that sustained steam-range heating and continuous extraction can support substantial PFAS concentration reduction and measured recovery without prolonged superheating, with a field treatment cost of approximately $166/m3 compared with a planning-level estimate of $524/$m^3$ for high-temperature treatment of the same volume.
Https://onlinelibrary.wiley.com/doi/epdf/10.1002/rem.70084

PHYTOREMEDIATION PILOT STUDY IN A MISSISSIPPI COMMUNITY IMPACTED BY PETROCHEMICAL REFINING
Ibrahim 1, N., U. Basnet, Z. Smith, C. Sutton, and V. Reed.
Environmental Remediation 1(1):4(2026)

A pilot study evaluated the phytoremediation potential of *Nerium oleander* and cabbage (*Brassica oleracea*) in a residential fence-line community within East Pascagoula, Mississippi, impacted by long-term petrochemical and shipyard activities. Plants were grown directly in contaminated garden soil under natural field conditions. Soil and plant tissue concentrations of lead (Pb), cadmium (Cd), zinc (Zn), and nickel (Ni) were measured using inductively coupled plasma optical emission spectroscopy. Phytoremediation effectiveness was assessed through removal efficiency, translocation factor, and bioaccumulation factor. Results showed significant reductions ($p <. 0.01$) in all soil metals, with cadmium removal exceeding 97%. *Nerium oleander* exhibited substantially higher metal uptake and translocation capacity than cabbage, achieving a maximum cadmium translocation factor of 9.99 and bioaccumulation factors up to 5.67. In contrast, cabbage showed lower translocation efficiency, suggesting limited remediation potential but suitability as a food crop after soil treatment. Findings highlight *Nerium oleander* as an effective, sustainable, and community-acceptable phytoremediation solution. *This article is* ***Open Access*** *at* https://www.mdpi.com/3042-903X/1/1/4.

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Research

SUPERFUND PROJECT: PFAS INVESTIGATIONS IN A COLD ENVIRONMENT
Eisen, K. | RemTech 2026: Remediation Technologies Symposium, 14-16 October, Banff, Alberta, Canada, 30 slides, 2026

PFAS contamination at a former aircraft firefighting training facility in Duluth, Minnesota, presents complex investigation and remediation challenges due to the site's cold climate, heterogeneous subsurface conditions, and proximity to sensitive water resources. The site is adjacent to residences with private wells and is located near the St. Louis River watershed, which drains into Lake Superior. Previous investigations identified PFAS impacts in soil, groundwater, surface water, sediment, and wildlife, prompting further assessment. The investigation focused on delineating the extent and magnitude of contamination, evaluating potential PFAS mass at the site, and quantifying contaminant migration through groundwater and surface water. Previous sampling identified PFOS concentrations in soil exceeding applicable industrial screening values and PFOS and PFHxS concentrations in groundwater exceeding state and federal drinking water standards at multiple monitoring wells. Wildlife studies also identified elevated PFAS concentrations in tree swallow eggs and nestlings near the facility, while creek chub collected from Sargent Creek exhibited among the highest PFOS concentrations reported in Lake Superior and the second highest in Minnesota. An investigation incorporated cone penetration testing (CPT), soil borings, monitoring well installations, and continued groundwater and surface water monitoring. The investigation illustrates the technical and logistical challenges of characterizing PFAS contamination in cold environments, where complex geology, seasonal conditions, and multiple contaminant transport pathways complicate site assessment. Integrating subsurface characterization with concentration and mass-flux monitoring provides a framework for refining the conceptual site model, evaluating offsite migration, protecting nearby water resources, and supporting the development of an effective long-term remedial strategy.
Https://esaa.org/wp-content/uploads/2026/10/KEVIN-EISEN.pdf

ENHANCED PERFORMANCES OF THE COUPLED THERMAL CONDUCTIVE HEATING-GROUNDWATER CIRCULATION WELL APPROACH

Hu, X., Y. Hu, C. Liu, W. Wang, S. Pu, T. Jiao, and C. Zheng
Journal of Contaminant Hydrology 208:104928(2026)

A series of lab-scale sandbox experiments complemented by numerical simulations aimed to evaluate the remediation performance of a coupled thermal conductive heating (TCH) - groundwater circulation well (GCW) system for a conservative tracer (brilliant blue) and nitrobenzene. For the conservative tracer, the remediation processes of the GCW were significantly expedited by heating, but the final remediated area and the remediation efficiency demonstrated similar results for different heating conditions. At a heating temperature of 110°C, the required remediation time consumption results for observation points were reduced by 2.5%-50% compared with no-heating conditions; the final remediated area results under heating conditions only increased by <6%. For nitrobenzene, higher heating temperatures led to better remediation performance, especially in tailing zones. Under the heating conditions, the remediated areas of nitrobenzene increased from 53.95% to 99.74%, and the required remediation time consumption results decreased by 4%-95%. Based on scenario analysis using numerical simulations, the relative contributions of four mechanism processes for removing nitrobenzene using the TCH-GCW approach were quantified and ranked as: convection > > hydrodynamic dispersion > volatilization > adsorption, while the removal of the conservative tracer was attributed to convection. The removed masses and relative contributions of nitrobenzene due to dispersion and volatilization increased as the heating temperature increased.

BEYOND COMPOST SOLIDS: SYSTEM-WIDE PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) DISTRIBUTION AND OXIDISABLE PRECURSOR POTENTIAL IN A FULL-SCALE IN-VESSEL COMPOSTING FACILITY

Khair Biek, S., L. S. Khudur, M. Askeland, J. Jones, K. Sundararajan, J. Besedin, G. Aguilar Jr., and A. S. Ball. | Chemosphere 412:145108(2026)

The occurrence, distribution, and oxidizable precursor potential of PFAS were investigated within a full-scale in-vessel food organics and garden organics (FOGO) composting facility in Victoria, Australia, focusing on leachate and leachate pit sediments as potential PFAS reservoirs. Targeted analysis of 33 PFAS and the total oxidizable precursor (TOP) assay were applied to feedstock, finished compost, leachate water, and leachate pit sediments. Mean ∑33 PFAS concentrations in feedstock (4.1 µg/kg dw) and finished compost (4.0 µg/kg dw) were comparable. However, PFAS were also detected in leachate-associated matrices with ∑33 PFAS concentrations of 2.7 µg/kg dw in leachate pit sediments and 0.42 µg/L in leachate, highlighting leachate pit sediments as an important PFAS-containing compartment within the leachate collection system. ∑PFCAs increased from 1.7 to 8.0 µg/kg dw in feedstock and from 3.2 to 9.3 µg/kg dw in finished compost following oxidation, demonstrating the presence of oxidizable PFAS precursor potential in both matrices. Leachate pit sediments also exhibited oxidizable PFAS precursor potential. Findings highlight the importance of considering leachate-associated residues alongside finished compost in PFAS assessment and management as regulation of recycled organics evolves.

ELECTROKINETIC REMEDIATION OF LINDANE-CONTAMINATED SILTY-CLAY SLUDGE: BENCH SCALE EVALUATION OF POLLUTANT REDUCTION AND SLUDGE DRYING
Valladares, Y., E. Lopez, S. Hereira-Pacheco, C. Urcola, J. Fernandez, M. Hernandez, and J. B. Gomez. | Remediation 36(4):e70086(2026)

Four bench-scale electrokinetic remediation (EKR) experiments were conducted on lindane-contaminated sludge from the Sardas landfill in Sabinanigo, Spain, under different conditions, such as electric field intensities of 100 and 200 V/m and carbon or iron electrodes. Physicochemical parameters and organochlorine compound concentrations in the solid, liquid, and gas phases were measured over 15 or 30 days. The carbon-electrode configuration at 200 V/m induced the most pronounced physicochemical shifts, rapidly reducing electrical conductivity, water content, and pH. Moreover, the 200 V/m experiment produced the greatest transformation and reduction of HCH isomers in lindane-contaminated sludge. HCH isomers were transformed through dechlorination and hydroxylation into organochlorinated by-products, including lower-chlorinated chlorobenzenes (one to four chlorine atoms) and chlorohexanes (four to five chlorine atoms). Results suggest that treatment performance was influenced by electrode material and electric field strength, while the concurrent decrease in sludge water content may facilitate handling and stabilization. Further EKR studies are required to assess the feasibility, long-term performance, and operational constraints under in situ conditions, such as those present in the leachate pond of the Sardas landfill.
Https://onlinelibrary.wiley.com/doi/epub/10.1002/rem.70086

PROMOTED HEXAVALENT CHROMIUM REMOVAL USING BIOCHAR-SUPPORTED COBALT-DOPED MOLYBDENUM DISULFIDE: INTERFACIAL TRANSFORMATION, AGING, AND MECHANISTIC INSIGHTS
Wu, B., Q. Chen, F. Al Marzooqi, and O. Eljamal.
Chemosphere 413:145114(2026)

A rice-husk-derived biochar-supported cobalt-doped molybdenum disulfide composite (BC@Co-MoS_2) was developed for the removal of Cr(VI), with emphasis on its interfacial structure, storage-induced evolution, and removal mechanism. Biochar support improved Co-MoS2 dispersion and suppressed severe restacking, providing a heterogeneous reactive interface. One month of natural aging increased the 15-min Cr(VI) removal efficiency from ~31.9% to 93.8%. Controlled storage experiments showed that this performance change was associated with oxidative exposure rather than storage time alone. Naturally aged BC@Co-MoS_2 produced 240 mg/L sulfate after 120 min, 4.8 times that of the inert-stored material, accompanied by proton-releasing behavior and oxidation-related evolution of the Mo-S domains. When self-acidification was suppressed by maintaining the solution at pH 6.0, the difference in Cr(VI) removal between fresh and aged materials decreased by ~2 percentage points, indicating that the apparent enhancement was governed predominantly by a pH-mediated effect rather than increased intrinsic removal capacity. Time-dependent chromium speciation revealed the transient formation of dissolved Cr(III), while Cr 2p XPS confirmed Cr(III) on the spent composite, supporting a coupled Cr(VI) reduction–retention pathway. Findings demonstrate that storage-induced interfacial evolution can substantially

alter the apparent reactivity of MoS_2-based composites and should be considered when evaluating their performance and stability.

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General News

FACTORS INFLUENCING THE TRANSPORT AND TRANSFORMATION OF PER- AND POLYFLUOROALKYL SUBSTANCES IN GROUNDWATER SYSTEMS

Qu, H., H. Li, X. Gu, G. Chen, K. Hui, C. Sun, Y. Yuan, and W. Tan
Environmental Research 303(Part 2):124807(2026)

This review summarizes the key factors governing PFAS transport and transformation in groundwater and explains the associated mechanisms. Current evidence indicates that chain length and terminal functional groups largely determine PFAS mobility, with long-chain and sulfonated PFAS being more prone to retention, whereas short-chain PFAS exhibit markedly higher mobility. Environmental parameters such as pH, dissolved organic matter (DOM), and salinity regulate PFAS adsorption-desorption by modifying interfacial charge, electric double-layer structure, and competitive sorption processes. Groundwater table fluctuations further influence PFAS release and partitioning by altering air-water interfacial areas and hydrodynamic conditions. In addition, these factors often operate through synergistic pathways. For example, pH can modulate the charge characteristics of natural organic matter, thereby shaping PFAS sorption behavior; DOM and microorganisms jointly affect PFAS adsorption and degradation; and dissolved oxygen, together with microbial community structure, determines the extent of PFAS biotransformation. Under low-oxygen or anaerobic conditions, specific microorganisms and functional enzymes may participate in the transformation and partial defluorination of certain PFAS. The review provides a theoretical framework for controlling PFAS-contaminated groundwater and proposes potential routes for the remediation of PFAS-impacted aquifers.

CONSIDERATIONS FOR ADDRESSING PROBLEMATIC COMPOUNDS IN VAPOR INTRUSION EVALUATIONS

Eklund, B. and R. Rago. | Remediation 36(4):e70082(2026)

This study considers seven "problematic" compounds that can often confound VI investigations. Screening level exceedances may not necessarily be reflective of a complete VI pathway for these compounds. The rationale varies, with two compounds (1,3-butadiene and acrolein) sometimes reported in soil vapor potentially due to sampling and analytical false positives, vinyl chloride removed from shallow soil vapor via aerobic biodegradation, carbon tetrachloride present in indoor air due to outdoor sources, and three compounds (chloroform, 1,4-dichlorobenzene, and 1,2-dichloroethane) potentially present in indoor air due to indoor air emission sources. Strategies and considerations are provided for VI practitioners to understand and address when these compounds are reported in VI studies.
Https://onlinelibrary.wiley.com/doi/epdf/10.1002/rem.70082

UNRESOLVED FLUORINE IN PER- AND POLYFLUOROALKYL SUBSTANCES TREATMENT SYSTEMS: IMPLICATIONS FOR DESTRUCTION EVALUATION
Modiri, M., P.C. Sasi, and L.S. Lee. | Remediation 36(4):e70087(2026)

A conservation-based fluorine mole balance framework is presented for interpreting PFAS treatment performance when complete fluorine closure is not achieved. The framework distinguishes separation technologies, where fluorine should redistribute to residual or concentrate streams, from destructive technologies, where organic fluorine should convert to the fluoride ion or hydrogen fluoride. Unresolved fluorine fraction is defined as the portion of influent fluorine not quantified in measured output compartments and provide scenario-based interpretation pathways for acceptable fluorine closure. The framework integrates targeted PFAS analysis, bulk organofluorine measurements, total fluorine, fluoride ion or hydrogen fluoride quantification, suspect screening, non-target analysis, and quality assurance/quality control considerations. Case studies from thermal reactivation, hazardous waste incineration, mechanochemical treatment, and supercritical water oxidation show that high targeted PFAS removal can coexist with incomplete fluorine mass closure, transformation products, or unresolved fluorinated residuals. The framework supports more transparent interpretation of PFAS treatment studies and helps distinguish removal, transformation, mineralization, incomplete destruction product formation, and unresolved fluorine fate.

TRIFLUOROACETIC ACID (TFA) IN THE ENVIRONMENT: OCCURRENCE, PERSISTENCE, AND TREATMENT
Zenobio, J.E., F. Pazoki, C. McCarthy, B. DiGuiseppi, and S.-Y. (Dora) Chiang. Remediation 36(4):e70083(2026)

This study synthesizes available data on TFA occurrence, toxicity, and treatment to evaluate its environmental behavior and management challenges. Toxicity data indicate low intrinsic toxicity across aquatic, terrestrial, and mammalian systems, with effects observed at concentrations well above typical environmental levels. Interpretation remains limited by variability in analytical methods and gaps in long-term and cross-species data. Treatment technologies developed for legacy PFAS are largely ineffective for TFA. Sorption- and interfacial-based processes provide negligible removal, while separation processes, such as reverse osmosis, concentrate TFA into residual streams. Many oxidative, electrochemical, and plasma-based systems do not achieve mineralization and may generate TFA as a terminal product. Only a limited number of technologies demonstrate defluorination under controlled conditions, with hydrothermal alkaline treatment (referred to as HALT) among the few approaches achieving complete defluorination. Overall, TFA represents a practical limitation of current PFAS management strategies, with persistence through treatment systems likely leading to increasing dominance in treated waters and expansion of diffuse plumes.

The Technology Innovation News Survey welcomes your comments and suggestions, as well as information about errors for correction. Please contact Michael Adam of the U.S. EPA Office of Superfund and Emergency Management at adam.michael@epa.gov or (703) 399-4268 with any comments, suggestions, or corrections.

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