Entries for December 1-15, 2024

Market/Commercialization Information

F -- R7 GRANBY SUBDISTRICT NEWTON COUNTY MINE TAILINGS (SOL)
U.S. Environmental Protection Agency, Region 7 Contracting Office, Lenexa, KS
Contract Opportunities on SAM.gov 68HE0725R0007, 2025

This is a service-disabled, veteran-owned small business set-aside under NAICS code 562910. EPA Region 7 Contracting Office seeks a contractor to remediate site source area soils to meet cleanup criteria as described in the 2010 OU2 ROD as modified by the 2018 and 2020 ESDs. The Basis of Design prepared by HydroGeoLogic, Inc. provides specifications for remediation. The contractor shall coordinate all field activities with EPA prior to the commencement of any field work. Specific tasks include gaining access to all properties; preparing pre-field site-specific plans; conducting site visits and developing area-specific work plans; preparing field and post-field reports; preparing completion reports; preparing the site for remediation; removing mine waste; installing and maintaining erosion control measures; regrade and restore the repair areas; revegetate the repair areas; fill mine shafts, vent pipes, and small subsidence pits; and hire an independent third-party surveyor to survey the work areas at various points during construction. All work performed shall be completed in accordance with the PWS and the Quality Assurance Surveillance Plan (QASP), which were developed in accordance with CERCLA, the National Contingency Plan, the Record of Decision (ROD) issued in June 2010, and the Explanation of Significant Differences in September 2018 and September 2020. The period of performance for this contract is 12 months from the date of contract award with four (4) optional periods of 12 months each. Offers are due by 2:00 PM CST on February 7, 2025https://sam.gov/opp/471a9c23b126d293831111b2df0acff4/view

R -- SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM (START) 6 SOLICITATION (SRCSGT)
U.S. Environmental Protection Agency, Region 9 Contracting Office, San Francisco, CA
Contract Opportunities on SAM.gov 68HE0925R0007, 2025

This is a sources sought notice for marketing research purposes. EPA Region 9 issued this notice to determine the availability of small businesses, small disadvantaged businesses, HUBZone small businesses, woman-owned small businesses, veteran-owned small businesses, and 8(a) small businesses, etc. (NAICS code 541620) capable of performing the requirements of the Statement Of Work (SOW) or Performance Work Statement as applicable, for nationally consistent advisory and assistance to EPA OSCs and other federal officials implementing EPA responsibilities under the national response system for the Superfund Technical Assessment and Response Team class of contracts. The primary performance of work will be conducted within EPA Region 9 as well as outside the region for a backup regional response. Contractors may need to respond to unforeseen national incidents and be able to perform outside the region on behalf of EPA Region 9. In times of a national incident or event, additional response areas may include the remaining States, the Virgin Islands, and Puerto Rico. The contractor shall be able to maintain a 24-hour, seven-day-a-week year-round response capability to support EPA needs within and outside the region on a backup regional, cross-regional, national, and/or international response. Activities are described in the SOW/PWS and include but are not limited to: hazardous materials emergency response; planning, preparedness, and prevention; environmental assessment and inspection; environmental technical support; data management; and, training. A business does not need to have all the capabilities to perform the tasks listed within the SOW/PWS but must demonstrate how it would cover all the tasks. A business may submit its qualifications based on a teaming arrangement with other business (es). Contractors shall have extensive experience in investigating, assessing, and directly supporting the restoration of a contaminated environment. Capability statements are due by 4:00 PM PST on February 7, 2025.https://sam.gov/opp/af9b3df2ad364717bc54482c915b4f56/view

F -- ENVIRONMENTAL PROTECTION AGENCY (EPA), SINGLE- AWARD TASK ORDER CONTRACT (SATOC) FOR THE AMERICAN CREOSOTE SITE (ACW) IN JACKSON, TN (SOL)
U.S. Army Corps of Engineers, Savannah District, Savannah, GA
Contract Opportunities on SAM.gov W912HN25R1000. 2025

This is a total small business set-aside under NAICS code 562910. The U.S. Army Corps of Engineers, Savannah District, requires a full range of environmental remediation services at the American Creosote Site in Jackson, Tennessee. The required services include environmental remediation for hazardous toxic and radioactive waste and wetland mitigation. Work will NOT include services related to military munitions response and range and UXO support. Services may include, but are not limited to, the assessment, inspection, investigation, study, control, characterization, containment, removal, and/or treatment of environmental contamination from pollutants, toxic substances, perfluorinated compounds, and preparing workplans, remedial design documents, and reporting. The award will be a Single Award Task Order Contract (SATOC) with a five-year base period and one six-month option period. Offers are due by 2:00 PM EST on February 5, 2025. https://sam.gov/opp/735ef7cb773f4f859731d0c0fd6db9f5/view

F -- ENVIRONMENTAL REMEDIATION SERVICES (ERS) (PRESOL)
U.S. Army Corps of Engineers, Pacific Ocean Division, Alaska District, Anchorage, AK
Contract Opportunities on SAM.gov W911KB25R0012, 2025

This is a total small business set-aside under NAICS code 562910. The U.S. Army Corps of Engineers (USACE), Pacific Ocean Division (POD), Alaska District (POA) requires services necessary to execute projects under the Environmental Remediation Services (ERS) Program. Requirements will support the emergency response required of POA under the federal National Contingency Plan for oil spills and hazardous substance releases (40 CFR Part 300 – National Oil and Hazardous Substances Pollution Contingency Plan). POA historically has the largest environmental program of the four (4) POD District offices. This acquisition will be utilized for up to 95% on requirements in Alaska. Only 5% of the capacity is anticipated to possibly be carried out at other locations, including within the USACE POD Area of Responsibility (AOR), which includes but is not limited to Alaska, Hawaii, Japan, Korea, and the Pacific Islands. The award is an Indefinite-Delivery/Indefinite-Quantity (IDIQ) Multiple Award Task Order Contract (MATOC) for four to six contracts under a total small business set-aside with a maximum shared capacity of $97M. Offers are due by 2:00 PM AKST on February 4, 2025. https://sam.gov/opp/b8eff1a92374ab9ab8318c4fd42a8ac/view

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Cleanup News

A CONCEPTUAL SITE MODEL FOR PER- AND POLYFLUOROALKYL SUBSTANCE WATER SUPPLY IMPACTS IN A RESIDENTIAL COMMUNITY
Raup, J., M. Eberle, E. Denly, D. Glass, J. Stefansky, J. Dyber, B. Scharf, and S. Saucier.
Remediation 35(1):e70001(2024)

PFOA and PFOS were detected at concentrations that exceeded drinking water standards in bedrock and overburden monitoring wells at a Class 4 State Superfund site in a New York City suburb. A bedrock private water supply well sampling program and a PFAS source investigation consisting of overburden investigations near potential sources were undertaken to assess exposures and identify and potentially eliminate sources of PFAS in the bedrock drinking water supply. Relative ratios of PFAS were plotted geospatially to facilitate comparison of the characteristics of overburden groundwater sampling results to that of nearby bedrock private water supply sampling results. Total PFAS concentrations in overburden groundwater and bedrock private water supply samples were compared to identify potential sources of bedrock groundwater impacts. The PFAS signature analysis revealed that (1) PFAS signatures of overburden groundwater samples were generally consistent with nearby bedrock private water supply samples; (2) total PFAS concentrations detected in overburden groundwater samples were marginally higher than concentrations detected in nearby bedrock private water supplies; (3) there was generally low variability in PFAS signatures throughout the study area; and (4) overburden groundwater and bedrock private water supply PFAS signatures were similar to that of the nearby wastewater treatment plant effluent discharge, which represents a composite average PFAS signature for domestic wastewater from the area. Septic system tracers were also detected in bedrock private water supply and overburden groundwater samples. Multiple lines of evidence support the conceptual site model, which is likely applicable to many PFAS-contaminated drinking water supplies with conditions similar to the assessment area: consumer product use and discharge to domestic septic systems in a densely developed residential area, lacking area-wide municipal water and sewer, with shallow groundwater and bedrock, and a vertical downward groundwater gradient, have resulted in the widespread presence of PFAS in private water supply wells.

A COST COMPARISON OF PUMP-AND-TREAT AND IN SITU COLLOIDAL ACTIVATED CARBON FOR PFAS PLUME MANAGEMENT
Birnstingl, J. and J. Wilson. I Remediation 35(1):e70005(2024)

Full installation and operational costs of a pump-and-treat (P&T) system are compared with those of a hypothetical contemporary in situ colloidal activated carbon (CAC) barrier. Worked examples are provided using public domain data from the FT-02 fire-fighting training site on the former Wurtsmith Air Force Base in Oscoda, MI. The projected CAC costs are – one-third of the P&T costs over projection periods of 15-100 years ($7.2M vs. $19M at 30 years; 38%). Hydraulic containment and CAC remediation systems prevent the spread of PFAS-contaminated groundwater. Performance data of the installed P&T hydraulic containment system were analyzed to estimate the time to remedial completion using the system alone. Data extrapolation supported by statistical analysis indicates cleanup targets will not be reached within 100 years of pumping. It is not realistic for P&T to be regarded as a means of cleanup as the aquifer will remain contaminated for the realistic future. A comparison is made between P&T and CAC on their common basis as containment approaches. The goal is to reduce the exposure of downgradient receptors to PFAS. https://onlinelibrary.wiley.com/doi/epdf/10.1002/rem.70005

BOUNTIFUL SUPERFUND CASE STUDY UPDATE: REVIEW OF LONG-TERM PERFORMANCE OF COMBINED PERMEABILITY ENHANCEMENT AND CHEMICAL REDUCTION IN LOW PERMEABILITY SOILS WITH RESIDUAL DNAPL
Kessell, L. I DCHWS West 2024 Fall Symposium, 6-8 November, Denver, CO, 22 slides, 2024

Bioremediation amendment injections were performed at the Bountiful/Woods Cross Operable Unit 1 Superfund site to reduce the source area and mitigate the dilute plume. While bioremediation was effective in the higher permeability sandy soils, rebound occurred in several areas in the silty low permeability zones, highlighting potential limitations in the remedial design or the conceptual site model (CSM). Results of additional high-resolution characterization supported a revised CSM that refined the limiting conditions and optimized the remediation approach that better confronted high residual mass challenges and associated diffusive mass flux limitations. The optimized approach centered on implementing permeability enhancement with chemical reduction. Models, methods, and procedures are presented to explain how mass flux rates of VOCs in low permeability media are increased and how engineered chemistries or remediation technologies were designed to control it. Injectate verification methods revealed a complex interconnected nesting of low- to high-angle oblique injectate planes resulting from proximal injection fields. Hydraulic conductivity studies of sand and ZVI media revealed improved hydraulic conductivity within the injection lenses, leading to hydraulic control of groundwater flow through the treatment zone. Eight years of bioremediation performance data along with seven years of performance data for the subsequent permeability enhancement with chemical reduction revealed that increased and controlled groundwater transport through the target treatment zone is a primary benefit. A secondary benefit includes reducing back-diffusion time frames, leading to limited or no rebound and rapid compliance with groundwater standards. With engineered chemistries and reagents to reduce, destroy, or sequester the contaminants of concern over extended time periods, hydraulic injections to increase hydraulic conductivity within the treatment zone can achieve improved performance and rapid compliance at sites with a single injection event.
https://mediacdn.guidebook.com/upload/213715/KcJk6RCM5yxhXSc6mbm5LKfP02Rchc2FWRL1.pdf

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Demonstrations / Feasibility Studies

IN SITU THERMAL TREATMENT OF PFAS IN VADOSE ZONE SOILS
Fitzgerald, N. I DCHWS West 2024 Fall Symposium, 6-8 November, Denver, CO, 18 slides, 2024

A field-scale pilot test funded through ESTCP (https://serdp-estcp.mil/projects/details/94949542-f9f7-419d-8028-8ba318495641) was conducted to demonstrate in situ thermal desorption of PFAS from vadose zone soil at a former fire training area where PFAS impacts to soil exceeded screening levels by 2 orders of magnitude. The soil was heated to an average temperature of 403.6ºC using an electrically powered thermal conduction heating system. PFAS concentrations were measured in soil before and after the pilot test. Subsurface vapor collected during system operations and the generated condensate were also routinely sampled for PFAS. The off-gas and condensate were treated using vapor and liquid phase granular activated carbon, respectively prior to discharge. Subsamples of the condensate underwent hydrothermal alkaline and ultraviolet-sulfite destructive treatment. PFAS concentrations measured in the vapor and condensate streams were used to construct a mass balance around treatment operations. When a temperature of at least 350 °C was maintained for seven days, a 99.5% average PFOS reduction in soil was observed. It was suspected that there was long-term shallow water incursion on the eastern side of the test area and that the target temperatures were either not reached or not held for the test duration. PFAS removal from soil varied spatially on the eastern side of the test area. Several PFAS were also present on the eastern side after heating that were not present before heating, suggesting that transformation occurred during the pilot test. PFAS were measured in condensate throughout the pilot test. Concentrations in the condensate peaked 30 days after heating began and subsequently decreased as the heating progressed past 30 days. Granular activated carbon effectively treated the condensate and vapor to below the discharge limits.
https://mediacdn.guidebook.com/upload/213715/yNV3udAeZ62R8FDYDkVCXs2pmJG31Vprd3gH.pdf

INVESTIGATION AND CONTROL OF MANGANESE PRECIPITATION DURING THE OPERATION OF AN ION-EXCHANGE SYSTEM FOR PFAS REMEDIATION: A CASE STUDY ON THE EFFECTS OF BIOLOGY ON GROUNDWATER REMEDIATION
Brazell, T. I DCHWS West 2024 Fall Symposium, 6-8 November, Denver, CO, 15 slides, 2024

A PFAS treatment system utilizing PFAS-specific anion exchange resin experienced systemic operation issues due to solids fouling within the resin beds. The fouling of the resin resulted in frequent system shutdowns, which had significant economic impacts on the operation and maintenance of the treatment system. Differential pressure across the lead vessel rapidly increased upon system startup, resulting in an eventual system shutdown. Analysis of the solids collected from the lead vessels found that manganese and calcium were the primary cations present. Geochemistry testing, including XRD, EDS, and FTIR, identified the prevalence of birnessite precipitation from the bacteria in the site's water. Treatability studies were performed to identify a cost-effective method to prevent the manganese fouling. A slipstream sequestrant pilot was performed to assess if manganese could be kept in solution without negatively impacting PFAS treatment. Pilot performance was monitored for three months to assess manganese treatment, PFAS treatment, and operational parameters such as differential pressure. Results showed that sequestrant could prevent manganese precipitation in the resin bed without significantly impacting PFAS adsorption. The sequestrant treatment system was then implemented at full-scale, resulting in continuous operations over 6+ months to date, compared to ~2-3-month run-times before the implementation of the sequestrant. The results of this investigation highlight the importance of treatability testing prior to the design and implementation of a new treatment system, or the addition of a unit-operation within an existing treatment system. https://mediacdn.guidebook.com/upload/213715/csnpRZwhoRgekLQDEkMwrDNWoRQdocNb9Q1W.pdf

AN IN SITU REACTIVE ZONE APPROACH USING CALCIUM PEROXIDE FOR THE REMEDIATION OF BENZENE AND CHLOROBENZENE IN GROUNDWATER: A FIELD STUDY
Li, R., C. Wei, Z. Tang, M. Ali, Z. Ma, B. Li, A. Gu, and X. Song.
Journal of Environmental Management 373:123899(2024)

The remedial efficiency and mechanisms of benzene and chlorobenzene co-contaminants using calcium peroxide (CaO_2) were explored by integrating a field study and lab validation. In the field study, the radius of influence for each injection point using Geoprobe direct-push was larger than the designed value of 0.75 m in the reactive zones created by $_2$ supplemented with a buffer solution (Area A) and $_2$ only (Area B). Benzene and chlorobenzene were remediated to meet the cleanup goals within 5 months; rebounds observed in monitoring wells were treated effectively with the sustained effect of reagents. The laboratory validation experiments verified $_2$ with a buffer solution could maintain the pH values within the range of 6.05-7.69 and higher DO concentrations for a prolonged period. Biodegradation contributions for benzene were 43.47% and 42.02% in the $_2$ group and $_2$ adjusted with buffer solutions group, respectively, while those for chlorobenzene were 16.87% and 19.61%. The lab validation demonstrated that applying $_2$ supplemented with a buffer solution had the best remediation efficiency for benzene and chlorobenzene due to the contributions from both the free radicals HO• and the biodegradation of co-contaminants by the native microbial consortium. Intermediate byproducts, including phenol, 2-chlorophenol, and pyruvate, were detected in groundwater collected in the field. The biodegradation and oxidative degradation pathways of benzene and chlorobenzene with applying $_2$ were proposed. The microbial composition analyses for groundwater samples revealed that multiple functional bacteria capable of degrading benzene and chlorobenzene were enriched. Findings increase the understanding of the fundamentals of $_2$ as a slow oxygen-releasing reagent and its engineering applications to remediate organic contaminants in soil and groundwater.

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Research

RESEARCH BRIEF 360: COMBINING PLANTS AND SUNLIGHT TO BREAK DOWN HAZARDOUS COMPOUNDS
National Institute of Environmental Health Sciences, Superfund Research Program (SRP) Research, December 2024

Researchers designed a new material that effectively degrades harmful compounds, like PFAS, and bacteria. By combining the power of sunlight and a component of plants, called lignin, the approach harnesses sustainable and renewable resources to reduce exposures and protect health. To create the new material, researchers combined lignin with titanium dioxide to create a 3D polymer structure. In the lab, the new material could degrade PFOA into shorter chain PFAS. The photocatalyst was also tested against a mobile device coated with *Pseudomonas putida* bacteria, which it was able to sterilize similarly to a commercial disinfection wipe. It also degraded atenolol within five minutes, quicker than any of the other materials they tested. https://tools.niehs.nih.gov/srp/researchbriefs/view.cfm?Brief_ID=360

DUAL-FUNCTIONAL ADSORPTIVE MEMBRANES FOR PFAS REMOVAL: MECHANISM, CFD SIMULATION, AND SELECTIVE ENRICHMENT
Wan, H., F, Fang, K. Shi, Z. Yi, L. Zeng, D. Bhattacharyya, K. Tang, and Z. Xu.
Chemical Engineering Journal 500:156095(2024)

Dual-functional adsorptive membranes with hydrophobic backbone and quaternary ammonium moieties were designed to selectively intercept organic competitors while enriching PFAS. A 96.8% removal of PFOA was achieved and was also maintained across five reuse cycles with a total treatment capacity of 650 L/m ^{2}. The adsorptive membranes utilize synergistic electrostatic attraction and hydrophobic interactions, leading to a greater enrichment factor of 18.5 (PFOA over

humic acid) and a permeability of 34.6 L/m ²/h/bar (1.9- and 4.5-fold higher than reported NF 270 membranes, respectively). Computational fluid dynamics (CFD) modeling revealed that the sponge-like matrix effectively prevents channeling flow and enhances access to adsorption sites. Sensitivity analysis and the high Damkohler number indicated that the adsorption process is mass transfer-controlled, with the key parameters ranked in order of significance: residence time>fluid viscosity>intrinsic adsorption rate. With consistent removal performance with co-existing competitors, efficient regeneration, and reusability, the dual-functional adsorptive membranes offer promising practical efficacy for PFAS remediation.

CHANGEPOINT ANALYSIS OF NATURAL ATTENUATION IN GROUNDWATER IMPROVES FORECASTS OF TIME TO ATTAIN GOAL

Ferrey, M.L., R.W. Bouchard, and J.T. Wilson.
Groundwater Monitoring & Remediation 44(4):28-37(2024)

When a groundwater remedy is selected, the monitoring record is often evaluated to extract rate constants to attenuate contaminants over time. The rate constants are used to forecast a time when the concentrations will attain a cleanup goal. These evaluations typically assume the rate constant does not change. Data from 11 monitoring wells at the former Twin Cities Army Ammunition Plant were evaluated to test whether this assumption was valid for the site. A previous evaluation based on data from 1987-1999 extracted rate constants that would bring TCE concentrations in the 11 wells to the MCL on or before 2013. By 2020, only four wells had reached the MCL. Piecewise linear regressions were used to model the relationship between time elapsed and concentration of TCE for each well and identify changepoints in the attenuation rate over time. Each well had at least one changepoint with different TCE attenuation rates on either side of the changepoints. The slope of the most recent segment after the last changepoint provides the best information to forecast concentrations in the future. For four of the wells, that forecast indicated that concentrations of TCE would never reach the MCL. Piecewise linear regression analysis proved to be a valuable tool to detect changes in rate constants and to update forecasts of the time required for groundwater concentrations to reach a cleanup goal.

REMEDIATION OF PFAS-IMPACTED GROUNDWATER USING CATIONIC HYDROPHOBIC POLYMERS AS ULTRA-HIGH AFFINITY SORBENTS

Sierra-Alvarez, R., J. Field, J. Chorover, L. Abrell, and J. Hatton. SERDP Project ER18-1052, 168 pp, 2024

A study investigated the feasibility of utilizing a sorptive approach exploiting electrostatic and hydrophobic interactions to remediate PFAS-contaminated groundwater. The engineered polymers may exhibit a high affinity for PFAS due to their hydrophobic backbone and cationic N groups. A suite of polyaniline and polypyrrole-derived polymers were synthesized and characterized to test the hypothesis. The nature of the polymer substituents controlled polymer properties such as specific surface area, charge, and hydrophobicity, indicating that the new adsorbents can be tailored to enhance the adsorption of different PFAS compounds under a wide range of aqueous geochemical conditions. Results from adsorption isotherm experiments and rapid small-scale column tests demonstrated that the affinity of the most effective materials for PFAS in the ng/L range was competitive with that of activated carbon, even in water containing elevated natural organic matter and ion concentrations. The polymers also displayed fast PFAS adsorption kinetics, low desorption of adsorbed PFAS to aqueous media, and facile regeneration at ambient temperature. Additional testing confirmed the chemical stability of the polymers when stored under ambient conditions and their resistance to microbial attack. Results confirm that the newly developed adsorbents offer great promise for PFAS remediation. The team is currently working on a field application of the new adsorbents under SERDP and is also planning to seek funding to demonstrate the feasibility of the polymeric adsorbents at pilot-scale in an onsite packed-bed filtration system. Further work is required to develop a granular porous material with high PANI content to prevent the elevated pressure drops associated with powdered adsorbents.
https://serpub-prod-0001-124733793621-us-gov-west-1-s3-us-gov-west-1.amazonaws.com/s3fs-public/2024-07/ER18-1052%20Final%20Report.pdf?VersionId=_5a1pumgmpiy8vCEWzFq1M5EqV9_3ru
See more information on SERDP project: https://serdp-estcp.mil/projects/details/9296b4b-d6c9-46c5-ba1e-d020441ea42b

PERFORMANCE EVALUATION OF ELECTROKINETIC BIOREMEDIATION FOR WEATHERED PETROLEUM HYDROCARBON-CONTAMINATED SOIL

Syarif, A.N., A.J. Effendi, and S. Hidayat. I E3S Web of Conferences 485:02004(2024)

A study investigated the impact of electrokinetic remediation (EKR) time on total petroleum hydrocarbons (TPH) removal from soil, focusing on electroosmotic phenomena guided by Helmholtz-Smoluchowski theory. Soil samples were exposed to a constant 2 V/cm voltage gradient for 8, 16, and 24 hours, using a 0.05 M Na https://www.e3s-conferences.org/articles/e3sconf/pdf/2024/15/e3sconf_etmc2024_02004.pdf

PARTITIONING OF NEUTRAL PFAS IN HOMES AND RELEASE TO THE OUTDOOR ENVIRONMENT: RESULTS FROM THE IPA CAMPAIGN

Eichler, C.M.A., N.Y. Chang, D.E. Amparo, E.A.C. Hubal, J.D. Surratt, G.C. Morrison, and B.J. Turpin. Environmental Science & Technology 58(42):18870-18880(2024)

Nine neutral PFAS in dust, airborne particles, dryer lint, and on heating and air conditioning (HAC) filters were measured in 11 homes in North Carolina as part of the University of North Carolina's Indoor PFAS Assessment (IPA) Campaign and compared with concurrently collected gas and cloth measurements. Fluorotelomer alcohols (FTOHs) contributed most (≥75%) to total (Σ) measured neutral PFAS concentrations in dust, HAC filter, and dryer lint samples (mean ΣFTOH concentrations of 207 ng/g, 549 ng/g, and 84 ng/g, respectively). Perfluorooctane sulfonamidoethanols (FOSEs) dominated (mean ΣFOSE concentration of 0.28 ng/m³ or 75,467 ng/g). For FTOHs and FOSEs, resulting mean dust-air, HAC filter-air, dryer lint-air and particle-air partition coefficients in units of log($m^3/\mu g$) ranged (across species) from -5.1 to -3.6, -4.9 to -3.5, -5.4 to -4.1, and -3.2 to -0.78, respectively. It was estimated that cloth, gas phase, and HAC filters are the largest reservoirs for FTOHs, while cloth, HAC filters, and dust are the largest reservoirs for FOSEs. Release rates of neutral PFAS from homes to the outdoor environment are reported.

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General News

WHEN TO TRANSITION FROM ACTIVE REMEDIATION TO MONITORED NATURAL ATTENUATION

NAVFAC Fact Sheet. 5 pp, September 2024.

Transitioning from active remediation to monitored natural attenuation (MNA) can be a cost-effective strategy for managing sites that have encountered challenges in meeting closure criteria after active treatment significantly reduces contaminant levels. This fact sheet outlines a technical approach for performing transition assessments. A web-based learning and decision tool, the Transition Assessment Teaching Assistant (TA2) Tool, was developed as part of a project sponsored by SERDP to help practitioners gather information for site-specific transition assessments.
https://exwc.navfac.navy.mil/Portals/88/Documents/EXWC/Restoration/er_pdfs/m/MNA%20Fact%20Sheet%20September%202024.pdf?ver=itatZifSYpOmtqiHMQa2CQ%3d%3d

AEROBIC BIODEGRADATION OF CHLORINATED VOLATILE ORGANIC COMPOUNDS AND 1,4-DIOXANE IN GROUNDWATER

Clark, C. and L. Rhea. EPA/600/S-24/276, 4 pp, 2024

This research summary increases awareness of microbial co-metabolism as a potentially cost-feasible remedial method for large dilute plumes of mixed CVOCs and 1,4-dioxane. Remedial practitioners are mostly aware of the possibility of remediating CVOC plumes via reductive dehalogenation by microbes, but this metabolic pathway cannot reduce contaminants to de-minimis concentrations. Also, interactions between CVOCs and dioxane at moderate contaminant concentrations interfere with microbially mediated contaminant destruction. Less well-known is that inhibitory effects are less problematic at dilute concentrations and that co-metabolic microbial processes can degrade both kinds of contaminants below the range that direct metabolic processes can. However, subsurface conditions may need to be modified for co-metabolism to occur. This summary discusses this and other key aspects of implementation and monitoring for remediation via co-metabolism. https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=363547&Lab=CESER

HYDROGEL SORBENT-BASED SAMPLE PREPARATION PROCESSES AS GREEN ALTERNATIVES FOR THE EXTRACTION OF ORGANIC CONTAMINANTS FOLLOWED BY CHROMATOGRAPHIC ANALYSIS

Alampanos, V.D. and D.A. Lambropoulou.
TrAC Trends in Analytical Chemistry 174:117687(2024)

In recent years, efforts have focused on making pretreatment approaches more environmentally sustainable and eco-friendly, introducing microextraction techniques, advanced materials, innovative solvents, automated setups, and technological advancements. A particular focus is on exploring and integrating new sorbents into microextraction techniques. Among the emerging materials, hydrogels have garnered significant interest due to their unique features, including polymeric 3-D sorptive networks of hydrophilic chains, enhanced porosity, open-structure geometry, and valuable mechanical properties. They are amenable to various chemical modifications to acquire specific physicochemical properties and integrate advanced materials like carbon and magnetic nanoparticles, boosting their sorbent and application potential for diverse targets. This article presents the majority of demonstrated hydrogel-based sample preparation approaches for extracting organic analytes, coupled with liquid-chromatographic-(LC) or gas-chromatographic-(GC) methods, focusing on the key role of the hydrogel and the environmentally-friendly characteristics of the methods.

ENVIRONMENTAL MACHINE LEARNING, BASELINE REPORTING, AND COMPREHENSIVE EVALUATION: THE EMBRACE CHECKLIST

Zhu, J.-J., A.B. Boehm, and Z.J. Ren.
Environmental Science & Technology 58(45):19909-19912(2024)

A recent critical review (https://pubs.acs.org/doi/10.1021/acs.est.3c00026) highlighted that many environmental machine learning (ML) papers could enhance their impact and clarity by adhering more closely to best practices. The review closely examined 148 highly cited environmental ML papers and found only 24%, 48%, 37%, and 26% of the studies reported their methods for missing data management, feature selection, feature scaling, and hyperparameter optimization, respectively. After publishing the review, numerous requests were received for easy-to-use guidelines to assist authors, reviewers, and editors to better conceptualize, prepare, conduct, and evaluate ML research. In response, the authors introduce the Environmental Machine-learning, Baseline Reporting, And Comprehensive Evaluation (EMBRACE) Checklist. The EMBRACE Checklist, along with accompanying instructions in the Supporting Information, and a newly constructed GitHub repository are designed to help researchers maximize the comprehensive assessment and impact of their ML research while adhering to best practices for reporting. Using the checklist, researchers can ensure they provide important methodological details, identify critical problems, implement robust and explainable models, and improve the overall quality and impact of their ML research. Best practices can be incorporated by referencing the EMBRACE Checklist before implementing ML research.

THE GLOBAL THREAT FROM THE IRREVERSIBLE ACCUMULATION OF TRIFLUOROACETIC ACID (TFA)

Arp, H.P.H., A. Gredelj, J. Gluge, M. Scheringer, and I.T. Cousins.
Environmental Science & Technology 58(45):19925-19935(2024)

Trifluoroacetic acid (TFA) is a persistent and mobile substance increasing in concentration within diverse environmental media, including rain, soils, human serum, plants, plant-based foods, and drinking water. Currently, TFA concentrations are orders of magnitude higher than other PFAS. The accumulation is due to many PFAS having TFA as a transformation product, including several fluorinated gases, pesticides, pharmaceuticals, and industrial chemicals, in addition to direct release of industrially produced TFA. Due to TFA's extreme persistence and ongoing emissions, concentrations are increasing irreversibly. What remains less clear are the thresholds where irreversible effects on local or global scales occur. Mammalian toxicity studies indicate that TFA is toxic to reproduction and that it exhibits liver toxicity. Ecotoxicity data are scarce, with most data being for aquatic systems; fewer data are available for terrestrial plants where TFA bioaccumulates most readily. These trends imply that TFA meets the criteria of a planetary boundary threat for novel entities because of increasing planetary-scale exposure, where potential irreversible disruptive impacts on vital earth system processes could occur.

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 Remediation and Technology Innovation at adam.michael@epa.gov or (703) 603-9915 with any comments, suggestions, or corrections.

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