Entries for April 1-15, 2025

Market/Commercialization Information

REMOVAL AND DISPOSAL OF PFAS/PFOA COMPROMISED SOIL (SRCSGT)
U.S. Department of the Army, National Guard Bureau, USPFO Activity WIANG 115, Madison, WI
Contract Opportunities on SAM.gov W50S9F25Q0004, 2025

This is a sources sought notice for marketing research purposes only. The 115th Fighter Wing at Dane County Regional Airport--Truax Field in Madison, Wisconsin, is seeking responses from capable sources for services to remove and dispose of PFAS/PFOA-compromised soil in accordance with laws and regulations under NAICS code 562910. There is a single soil pile that is estimated at 13,200 cubic yards of material and an estimated 19,600 tons. The work includes sample collection and analysis to characterize the extent of soil contamination. Sample results will be used to determine the appropriate method of disposal (hazardous vs. non-hazardous) or treatment for these soils. Using sample results, the contractor will load, transport, and dispose of the soil at an EPA-approved disposal facility, to be identified and coordinated by the contractor, in accordance with all federal, state, and local requirements. Responses are due by 6:00 AM CDT on June 2, 2025. https://sam.gov/opp/1c3b6e4002c04676b3f58d7c3f29d7fc/view

NORTHWESTERN DIVISION REGIONAL $245 MILLION PRE-PLACED REMEDIAL ACTION CONTRACT INDEFINITE DELIVERY / INDEFINITE QUANTITY MULTIPLE AWARD TASK ORDER CONTRACT (SOL)
U.S. Army Corps of Engineers, Northwest Division, Seattle District, Seattle, WA
Contract Opportunities on SAM.gov W912DW25R0003, 2025

This is an 8(A) small business set-aside under NAICS code 562910. The USACE Northwest Division (NWD) requires a contractor to provide services to support hazardous, toxic, and radioactive waste remediation projects for both civilian and military agencies of the Federal Government. Most task orders will provide remedial action services and related incidental construction to meet the requirements of laws and programs such as RCRA, CERCLA, the EPA Brownfields Program; NCP; the Clean Water Act; the Clean Air Act; and other related Federal Programs, as well as state/local specific regulations/requirements dealing with hazardous waste management/disposal, USTs, and other fuels-related issues. Remedial actions may address both regulated and non-regulated toxic substances. It will also support the Defense Environmental Restoration Program (DERP); environmental compliance and pollution prevention projects under DoD's Environmental Quality Program; the Formerly Utilized Sites Remedial Action Program; environmental cleanup activities under the Base Realignment and Closure Program; DHS and FEMA; and other environmental and homeland security laws and regulations requiring support for military installations, Corps' civil works projects, and work for other federal agencies. The DERP projects will include Installation Restoration Program activities on active Army and Air Force installations and Formerly Used Defense Sites. The MATOC includes missions for NWK occurring in NY and NJ within EPA Region 2. The award will be a $245 million Pre-placed Remedial Action Contract IDIQ Multiple Award Task Order with firm-fixed-price and cost-reimbursable task orders, or a combination of both. The total length, including the exercise of all option periods, will not exceed five years and six months from the date of contract award. Offers are due by 10:00 AM PDT on June 9, 2025. https://sam.gov/opp/3b539cfda5a041e780dc8226c522d691/view

NAVFAC NORTHWEST LONG TERM MONITORING, OPERATIONS AND MAINTENANCE ENVIRONMENTAL REMEDIATION SERVICES (SOL)
U.S. Department of the Navy, NAVFAC Pacific Command Northwest, Silverdale, WA
Contract Opportunities on SAM.gov N4425525R2002, 2025

This is a total small business set-aside under NAICS code 562910. The NAVFAC Northwest intends to award a firm-fixed-IDIQ contract to perform Environmental Services for Long Term Monitoring, Operation, and Maintenance in the NAVFAC Northwest area of responsibility (AOR), which includes Washington, Oregon, Idaho, Montana, Alaska, Iowa, Minnesota, North Dakota, South Dakota, Nebraska, and Wyoming. It is anticipated that most of the work will occur in Washington State, however, projects could be located anywhere in the NAVFAC Northwest AOR. The LTMO contract is to perform Environmental Services, inclusive of environmental remediation services, environmental compliance services, technical consultation, long-term monitoring, and site operation and maintenance services. The estimated total aggregate capacity of this IDIQ is $45M up to 60 months with one base year, four 12-month option periods, and a possible up to 6-month extension. Task orders issued under the IDIQ will range from approximately $10 thousand to approximately $2 million per order. Offers are due by 12:00 PDT on June 13, 2025.https://sam.gov/opp/bb1ab64f0a7240f6884579bcb4cae882/view

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Cleanup News

UTILIZATION OF AN ULTRA-LIGHTWEIGHT FOAMED GLASS AGGREGATE (UL-FGA®) AS A FLOATING COVER FOR EMISSION REDUCTIONS AT A SUPERFUND SITE
Corrado, J.J. I DCHWS East 2025 Spring Symposium, 2-4 April, Philadelphia, PA, 17 slides, 2025

A former manufacturing site in central New Jersey with contaminated soil and groundwater is divided into several Operable Units (OUs). One involves two surface impoundments, which were used to store waste from a coal light oil refining process. The 4-acre impoundments contained ~54,500 yd $^{-3}$ of acid tar containing VOCs, primarily benzene. To date, ~2,575 yd^3 of acid tar have been removed, leaving ~51,925 yd^3 remaining in the impoundments. The impoundments are lined underneath with a ~1-ft-thick clay layer and a 3-ft water cap to reduce VOC emissions into the atmosphere. Impacted groundwater underneath the impoundments is collected and treated. Following site flooding from Tropical Depression Ida, a ~25-ft tall mechanically stabilized earth wall was designed and installed to protect the impoundments from future flooding events while providing a working platform from which to perform planned remedial activities. Remedial action includes excavating and dewatering the impoundment acid tar material, providing emission and odor control measures, offsite shipping of the principal threat waste for treatment/destruction as an alternative fuel for cement kilns, treating the remaining acid tar and contaminated soil and/or clay in the impoundments with in situ soil stabilization, and backfilling the excavated areas and installing a protective cap over the entire footprint. The presentation covers the evaluation testing and design development associated with utilizing and implementing Aero Aggregate® Ultra-Lightweight Foamed Glass Aggregates (UL-FGA®) as a floating cover system to reduce potential VOC emissions from the water cap, the pilot work completed to determine the required floating cover thickness, and conclusions, recommendations, and findings related to utilization of the innovative material as a floating cover system and its anticipated emission reduction potential.
https://mediacdn.guidebook.com/upload/213716/PBJEKwO8ACCNcdpIL4BqBhB2i0tcQQGMyDC6.pdf

COMPREHENSIVE REMEDIAL DESIGN APPROACH FOR THE AMERICAN CREOSOTE WORKS SUPERFUND SITE: OVERCOMING TECHNICAL CHALLENGES AND ENHANCING STAKEHOLDER ENGAGEMENT
Patel, A. I DCHWS East 2025 Spring Symposium, 2-4 April, Philadelphia, PA, 21 slides, 2025

This case study documents a comprehensive remedial design (RD) approach for the American Creosote Works (ACW) Superfund site and highlights remedial action implementation strategies, including technical problem-solving and stakeholder engagement. The RD was segmented into three main parts due to the site's complexity, stemming from multiple contaminant media zones within diverse site-specific geology. The site required a combination of remediation technologies, including barrier wall containment, thermal treatment, soil excavation, consolidation, capping, and in situ enhanced bioremediation. Key project achievements included:

- Prioritizing source control and human health risk reduction through strategic design modifications for contaminant media zones.
- Optimizing construction sequencing to minimize soil handling and expedite off-facility remediation.
- Developing a performance-based thermal treatment design with robust monitoring requirements.
- Implementing a "trust but verify" approach to review previously developed designs while encouraging stakeholder engagement.

The project exemplifies a holistic approach to environmental remediation, demonstrating how technical excellence, stakeholder trust, and collaborative problem-solving can be integrated to address complex environmental restoration challenges.
https://mediacdn.guidebook.com/upload/213716/YWBBsCpvDsDQPC1Q5Km3KG4BWu6WvBEBxkQ2.pdf

DESIGN CHALLENGE OF IMPLEMENTING MULTIPLE REMEDIAL TECHNOLOGIES TO ADDRESS MULTIPLE AREAS AND TYPES OF CONTAMINATION AT THE JACKSON CERAMIX SUPERFUND SITE
Thome, G. I DCHWS East 2025 Spring Symposium, 2-4 April, Philadelphia, PA, 15 slides, 2025

Underlying soil and groundwater at the Jackson Ceramix Superfund site, a former china manufacturing facility, were contaminated with CVOCs. The 233-acre site is divided into three operable units (OUs). OU-1 and OU-2 encompass contaminated soil and sediment west and east of an active railroad, respectively. OU-3 encompasses contaminated groundwater within the overburden and bedrock aquifers and has yet to be addressed. A remedial investigation, feasibility studies, and pre-design investigations were completed, and the nature and extent of contamination have been delineated. COCs include metals in soil, sediment, and groundwater, and DNAPL CVOCs. The dissolved metals and CVOC plume are in direct communication with surface water and site wetlands. Technologies selected and combined into RA alternatives include in situ stabilization to reduce bioavailability of metals in contaminated soils and sediments; ex situ stabilization to dewater and reduce leaching of contaminants from excavated materials; excavation and dredging of metals-contaminated soil and sediment; wetland dewatering; offsite disposal of excavated and dredged hazardous and nonhazardous waste soil/sediment; and in situ thermal treatment to address soil and groundwater DNAPL and high CVOCs associated with several CVOC source areas. Each remedial area had unique conditions, constraints, and challenges that needed to be addressed in the design for the successful implementation of the RAs. Implementation and restoration challenges also resulted from the presence of forested areas, wetlands, and critical ecological habitats. Significant coordination with site stakeholders and multiple property owners was required for gaining site access, securing tree-removal rights, identifying unknown property title transfers, and addressing redevelopment concerns. Addressing these complex issues in the RDs resulted in a holistic remediation approach. https://mediacdn.guidebook.com/upload/213716/iFUBPEawvBoc5NFsXXHLHYVkNTsQ2z15GvGp.pdf

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Demonstrations / Feasibility Studies

DEMONSTRATION OF A COMMERCIALY AVAILABLE PEEPER PASSIVE SAMPLER FOR PFAS IN SEDIMENT
Conder, J., R. Zajac-Fay, L. Nichols, B.G. Pautler, G. Rosen, N. Hayman, and A. Thapalia.
34th Annual International Conference on Soil, Water, Energy, and Air, 17-20 March, San Diego, CA, 33 slides, 2025

A project was conducted to demonstrate and validate the use of PFASsive™, a dialysis-based passive sampler "peeper" for measuring PFAS in sediment porewater and surface water. A comprehensive field study was conducted at nine different locations in freshwater creeks receiving PFAS from an AFFF site in May 2024. The presentation highlights the benefits of passive sampling for PFAS, sample design, fieldwork, and discusses the results of C_{free} measured in the passive samplers compared to measured PFAS in bulk media and organism tissue. PFOS was generally the most frequently detected (and highest detected PFAS) in samples. PFAS passive sampling results were well correlated with uptake. For example, passive sampling PFOS C_{free} was positively correlated (r^2 values of 0.73 to 0.88) with concentrations in clams exposed to site surface water and oligochaete worms exposed to site sediment. The data indicated that passive sampling can be used to help understand the fate and availability of PFAS in aquatic systems. https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-EA2E-2B6D-01D92AC0E42DCE3B_abstract_File25469/PresentationPDF_252_0314032708.pdf

BIOGEOCHEMICAL-BASED ISCR: EXCELLENT EXAMPLE OF PRE-DESIGN INVESTIGATION AND PILOT TEST EXECUTION
Studer, J.E., and K. Sheldon. I 34th Annual International Conference on Soil, Water, Energy, and Air, 17-20 March, San Diego, CA, 32 slides, 2025

A lesser-known ISCR approach is Biogeochemical Reductive Dechlorination (BiRD), the core of which is engineered in the in situ creation of permeable reactive zones (PRZ) populated by metastable ferrous monosulfides. Following a summary of scientific and practical motivations for commercialization of BiRD, the presentation covers site background including 30 years of remedial efforts, pilot test goals, synthesis of remediation-focused conceptual site model (CSM) and pre-design investigation (PDI), pilot test design basis, BiRD selection, pilot test design-execution-results, and implications for completion of subsurface cleanup. The pilot test successfully achieved goals because of effective planning, specification, execution of the PDI, treatment technology selection, and pilot test design and execution. Emphasized are upfront CSM synthesis, application of high-resolution site characterization tools, hydraulic fracturing technique, site-specific solid- and aqueous-phase reagents, and over 4 years of groundwater sampling and analysis events covering baseline and performance assessment, including Compound Specific Isotope Analysis for TCE and cDCE. The BiRD PRZ successfully reduced TCE mass flux with point concentration values exceeding 50,000 ug/L, with no accumulation of vinyl chloride or methane. The CSIA data documented the dominance of abiotic transformations. https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-EA2E-2B6D-01D92AC0E42DCE3B_abstract_File25469/PresentationPDF_210_0321093010.pdf

PILOT TEST RESULTS FROM A MIXED PFAS AND CHROMIUM PLUME USING BASE ACTIVATED COLLLOIDAL CARBON AND ACTIVATED SODIUM DITHIONITE
Cooper, E. I SWIX Webinar, 21 minutes, 2025

In addition to a soil removal interim action, EPA initiated pilot studies to finalize the remedy for groundwater remediation at a former electroplating facility in Dallas, Texas. Chemistries and injection approaches were selected for pilot testing to treat both Cr(VI) and PFAS. A formulation combining colloidal carbon and base-activated sodium dithionite was selected for the study to reduce Cr(VI) and sequester PFAS. A pilot test was conducted to evaluate the efficacy of this combined remedy. The presentation covers the design considerations for the pilot test, injection approach, logs, and post-injection groundwater results for Cr(VI) and PFAS (primarily PFOS and PFHxS). Based on the pilot test results, it appears that colloidal carbon combined with base-activated sodium dithionite is a viable in situ treatment option for these dual contaminants. https://www.youtube.com/watch?v=XmceiqBD2uQ

IN-SITU STABILIZATION OF MULTIPLE HEAVY METALS (PB, ZN, AS) BY FERROUS SULFATE—FROM BATCH EXPERIMENTS TO PILOT STUDY
Qi, S., Q. Chen, D. Shen, Y. Fang, Y. Cui, and J. Shentu.
Frontiers of Environmental Science & Engineering 19:36(2025)

Batch experiments were conducted to investigate the stabilization effect of heavy metals in soil from an iron-smelting site using multiple materials. Results showed that FeSO4 simultaneously reduced the bioavailable heavy metal (BHM) concentrations of Pb (61.1%), Zn (28.1%), and As (68.6%), respectively. $FeSO_4$ was further applied at a contaminated site. Results indicated that the heterogeneous distribution of stabilization efficiency deviated from that of batch experiments, which were influenced by multiple factors. Compared to the control group, the bioavailable Pb, Zn, and As concentrations decreased by 23.1, 13.6, and 4.73 mg/kg, respectively, when the injected FeSO4 concentration was 0.27 mol/L in the saturated zone. The decreased concentrations of bioavailable Pb, Zn, and As decreased with the distance from the injection well, showing a limited radius of influence at 1.0-2.0 m, larger than the theoretical value (0.92 m). Correlation analysis revealed a significant negative relationship between the change in BHM content and the fraction of BHM content before stabilization (FB), indicating that FB significantly controlled the stabilization efficiency. While excess injected $FeSO_4$ had only a slight influence on the stabilization efficiency of heavy metals, it negatively impacted groundwater. This study provides new perspectives for in situ stabilization and highlights the importance of pilot-scale experiments over batch experiments for guiding engineering activities.

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Research

ASSESSING AND MITIGATING BIAS IN PFAS LEVELS DURING GROUND AND SURFACE WATER SAMPLING
Field, J., T. Schwichtenberg, R. Deeb, E. Hawley, T. Wanzek, H. McIntyre, D. Bogdan, C. Schaefer, Jr., D. Drennan, D. Nguyen, B. DiGuiseppi, A. Struse, and H. Rectenwald. SERDP Project ER19-1205, 96 pp, 2025

The combination of multiple factors has led to regulatory concern and restrictive guidance to prevent false-positive PFAS sampling results. This project was completed to 1) assess several potential sources of bias and whether field sampling materials, equipment, and processes may pose a significant risk of sample contamination (or if current guidelines are unnecessarily restrictive, increasing time and cost in the field); 2) evaluate whether PFAS stratification in groundwater and surface water columns is significant enough to bias results, including the amount of the surface microlayer that is captured in the sample using different sampling methods; and 3) review existing studies on PFAS precursor transformation as a function of sample storage temperature and duration.
https://sepub-prod-0001-124733793621-us-gov-west-1-s3-us-gov-west-1.amazonaws.com/s3fs-public/2025-04/ER19-1205%20Final%20Report.pdf?VersionId=wLg36Qn_WPuIUIvA_1TEpNDZtwIve1L

OPTIMIZING LACCASE PRODUCTION FROM HALOTOLERANT ENTEROBACTER SP. GR18 FOR HYDROCARBON BIOREMEDIATION
Hosseini, S.M., A.A. Sepahi, M.R. Razavi, and P. Saffarian I Remediation 35(2):e70006(2024)

A study focused on optimizing laccase production from *Enterobacter* sp. *GR18*, which was isolated from the Grawan mineral spring near Sardasht, West Azerbaijan Province, Iran, and identified through comprehensive biochemical tests and 16S rRNA sequencing. Advanced methodologies were used to optimize laccase production conditions. The purified laccase enzyme was characterized using SDS-PAGE. The study investigated the effects of various carbon and nitrogen sources, metal ions, and inducers on enzymatic activity. Structural changes in crude oil samples treated with laccase were analyzed using NMR spectroscopy. *Enterobacter* sp. *GR18* showed exceptional laccase activity among 33 isolated strains. Glucose and yeast extract were the most effective carbon and nitrogen sources, respectively. Copper and iron ions significantly enhanced enzyme activity. NMR spectroscopy indicated substantial breakdown of complex hydrocarbons in crude oil samples posttreatment, demonstrating the enzyme's effectiveness in hydrocarbon degradation. The study reveals the potential of *Enterobacter* sp. *GR18* for high laccase production and efficient hydrocarbon degradation under extreme environmental conditions.

EFFECT OF ACTIVATED GGBS ON REMEDIATION OF A CLAY SOIL CONTAMINATED WITH MTBE
Estabragh, A.R., A.A. Shourijeh, A.A. Javadi, and M. Amini. I Remediation 35(2):e70008(2025)

Research investigated the efficacy of magnesium oxide (MgO) activated ground granulated blast furnace slag (GGBS) in remediating MTBE-contaminated clay soil through lab tests. Contamination was simulated by artificially introducing 2.25 mg MTBE/kg of soil in the lab. The GGBS activation process involved mixing GGBS and MgO in a ratio of 3:1. The mixture was then added to both natural and contaminated soil samples at percentages of 0.25%, 0.5%, and 1.0%. Results demonstrated that adding the binder improved the strength of both natural

and contaminated soil samples, with the magnitude of strength enhancement dependent on the percentage of the additive and the curing time. Scanning electron microscopy analysis indicated that the changes in soil properties and remedial effectiveness were attributed to chemical interaction between the soil minerals, the pollutant, and the binder. The results showed that the selected additive is suitable for the remediation of the contaminated soil.

INTERACTIONS BETWEEN PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) AT THE WATER-AIR INTERFACE
Lemay, A.C. and I.C. Bourg. Environmental Science & Technology 59(4):2201-2210(2025)

Molecular dynamics simulations were carried out for PFAS at varying interfacial densities to understand the impact of organic loading on PFAS adsorption. Adsorbed PFAS form strong mutual interactions that give rise to ordered interfacial coatings. These interactions often involve near-cancellation of hydrophobic attraction and Coulomb repulsion. Findings explain an apparent paradox whereby PFAS adsorption isotherms often suggest minimal mutual interactions while simultaneously displaying a high sensitivity to the composition and density of interfacial coatings. Consideration of the compounds present with PFAS at the interface has the potential to allow for more accurate predictions of fate and transport and the design of more efficient remediation approaches.

QUANTITATIVE SUSTAINABILITY ASSESSMENT FOR IN-SITU ELECTRICAL RESISTANCE HEATING COUPLED WITH STEAM ENHANCED EXTRACTION: AN EFFECTIVE APPROACH FOR THE DEVELOPMENT OF GREEN REMEDIATION TECHNOLOGIES
Yang, Z., C. Wei, J. Sima, S. Yan, L. Yin, A. Xian, J. Wan, J. Yang, and X. Song.
Water Research 267:122450(2024)

A study developed a quantitative assessment framework based on the life cycle assessment integrated with best management practices (LCA-BMPs) to evaluate the environmental, economic, and social sustainability of in situ electrical resistance heating coupled with steam enhanced extraction (ERH-SEE). Results indicated that ERH-SEE offered better environmental sustainability performance compared to ERH only, with a carbon emission reduction of 52.6%. ERH-SEE also significantly reduced human toxicity, resource consumption, and ecosystem impacts under the same remediation scenarios. Taking the renewable energy share in energy structure in different countries into consideration showed that higher shares of renewable energy used in energy supplies can substantially reduce the environmental footprint of the studied scenarios. Economic sustainability assessments showed that ERH-SEE was more sustainable than ERH only, reducing direct economic costs by 35.7% and providing higher levels of worker employment. ERH-SEE involved more complex operational procedures and presented more health risk exposure scenarios compared to ERH only, resulting in slightly more pronounced worker safety issues. Final normalized results showed that the overall sustainability of ERH-SEE and ERH only were 78.4 and 61.5, respectively, demonstrating that the sustainability performance of ERH-SEE was better than ERH only. Applying ERH-SEE in groundwater remediation where significant heterogeneities occur in the subsurface can increase the sustainability in developing countries, due to the lower percentage of renewable electricity in the energy supply.

GLOBAL AND LOCAL SENSITIVITY ANALYSIS OF HEAT TRANSPORT IN FRACTURED ROCK USING A MODIFIED IMPLEMENTATION OF THE LH-OAT METHOD
Wu, X.-l., B.H. Kueper, and K. Novakowski.
Groundwater Monitoring & Remediation 45(1):55-67(2025)

A three-dimensional numerical model was applied to investigate using thermal remediation of contaminated sites in fractured bedrock in global and local sensitivity analyses for the significance of six variables that potentially influence heating performance in fractured rock. These variables include the radius and energy delivery strength of the heat source, the fracture aperture, fracture spacing, groundwater flow velocity, and the thermal conductivity of the rock matrix. A discrete Latin Hypercube-One-at-A-Time scheme was proposed and utilized as an experimental design and data analysis method for the discrete variables that apply to this case. Results show that the radius of the source and energy delivery strength were the most sensitive parameters at all four monitoring points within the heating area. To minimize heat dissipation, additional heating wells were demonstrated to be effective for a small or pilot scale site (5 1,600 µm) are identified in the heating area. Resamplings and re-evaluations with one-way perturbation in both positive and negative directions are suggested to avoid biased results caused by perturbations that occur in only positive or negative directions. https://ngwa.onlinelibrary.wiley.com/doi/epdf/10.1111/gwmr.12696

DEFLUORINATION MECHANISMS AND REAL-TIME DYNAMICS OF PER- AND POLYFLUOROALKYL SUBSTANCES ON ELECTRIFIED SURFACES
Sharkas, K. and B.M. Wong. Environmental Science & Technology Letters 12(2):230-236(2025)

The first constant-electrode potential (CEP) quantum calculations are presented for PFAS degradation on electrified surfaces to shed light on their electrochemical processes. The advanced CEP calculations provide new mechanistic details about the intricate electronic processes that occur during PFAS degradation in the presence of an electrochemical bias, which cannot be gleaned from conventional density functional theory calculations. The CEP calculations were complemented with large-scale ab initio molecular dynamics simulations in the presence of an electrochemical bias to provide time scales for PFAS degradation on electrified surfaces. Taken together, the CEP-based quantum calculations provide critical reaction mechanisms for PFAS degradation in open electrochemical systems, which can be used to prescreen candidate material surfaces and optimal electrochemical conditions for remediating PFAS and other environmental contaminants.

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General News

SUPERFUND REMEDY REPORT, 18TH EDITION
EPA Office of Land and Emergency Management, EPA-542-R-25-001, 69 pp, 2025

EPA prepares the Superfund Remedy Report to provide information and analyses on remedies selected to address contamination at Superfund National Priorities List and Superfund Alternative Approach sites. This report is the latest in a series, prepared since 1991, on Superfund remedy selection. The latest edition focuses on the analysis of Superfund remedial actions selected in fiscal years 2021, 2022, and 2023. https://semspub.epa.gov/src/document/HQ/100003662

BIOTRANSFORMING THE "FOREVER CHEMICALS": TRENDS AND INSIGHTS FROM MICROBIOLOGICAL STUDIES ON PFAS
Skinner, J.P., A. Raderstorf, B.E. Rittmann, and A.G. Delgado.
Environmental Science & Technology 59(11):5417-5430(2025)

A meta-analysis was performed by extracting and standardizing quantitative data from 97 microbial PFAS biotransformation studies and comparing outcomes via statistical tests. It indicated that the likelihood of PFAS biotransformation was higher under aerobic conditions, in experiments with defined or axenic cultures, when high concentrations of PFAS were used, and when PFAS contained fewer fluorine atoms in the molecule. The meta-analysis also documented that PFAS biotransformation depends on chain length, chain branching geometries, and headgroup chemistry. The literature is scarce or lacking in (i) anaerobic PFAS biotransformation experiments with well-defined electron acceptors, electron donors, carbon sources, and oxidation-reduction potentials; (ii) analyses of PFAS biotransformation products; and (iii) analyses to identify microorganisms and enzymes responsible for PFAS biotransformation. To date, most biotransformation research has emphasized 8:2 fluorotelomer alcohol, 6:2 fluorotelomer alcohol, PFOS, and PFOA. A wide array of PFAS remains to be tested for their potential to biotransform.

A MINI-REVIEW ON ADVANCED REDUCTION PROCESSES FOR PER- AND POLYFLUOROALKYL SUBSTANCES REMEDIATION: CURRENT STATUS AND FUTURE PROSPECTS
Esfahani, E.B., F.A. Zeidabadi, L. Rajesh, S.T. McBeath, and M. Mohseni.
Current Opinion in Chemical Engineering 44:101018(2024)

The progress and prospects of advanced reduction processes (ARPs) over the past three to five years are reviewed in this article. Topics are categorized into three main sections: i) state-of-the-art of ARPs, comparing the promise and mechanisms of methods such as photochemical, ionizing irradiation, plasma, sonolysis, electroreduction, and zero-valent iron; ii) integration of ARPs with physical-separation methods, oxidation processes, and their role in regeneration/management of PFAS-laden media; and iii) challenges/innovations in real-world application of ARPs. It also proposes three primary future research directions in alignment with the current and upcoming research focuses. https://www.sciencedirect.com/science/article/pii/S2211339824000194/pdfft?md5=6bc723834847ab663a6d219d0371efcd&pid=1-s2.0-S2211339824000194-main.pdf

BACK DIFFUSION EVALUATION AND REMEDIATION: A SUMMARY OF ONGOING RESEARCH ACTIVITIES
Brooks, M. I Groundwater Forum monthly meeting, 6 March, 27 slides, 2025

An evaluation framework based on five lines of evidence was developed to help evaluate the potential significance of plume persistence due to back diffusion at groundwater contaminated sites. This framework was then used to construct a Bayesian network model that provides a quantitative prediction of the likelihood for back diffusion. The prediction relies on evaluating the strength or weakness of each line of evidence, which is assessed using site characterization data. The second research area concerns the forward diffusion of remedial amendment to degrade contaminants in the low permeability layer or zone (LPZ). While amendment injection has not traditionally been considered efficient when LPZs are present due to flushing limitations, it is important to recognize that flushing limitations may be minimized, or at least predicted, with design considerations that explicitly account for LPZ diffusive transport. The amendment will undergo back diffusion just like the contaminant, and it is important to ensure the residence time of the amendment in the LPZ is comparable to that of the contaminant under diffusive transport. These concepts are demonstrated using one-dimensional computer modeling, and a screening-level evaluation is being explored to aid in remedial designs.
https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=351098&lab=CESER&simplesearch=0&showcriteria=2&sortby=pubDate&timstype=&datebeginpublishedpresented=06/15/2019&searchall=remediation+

REMEDIATION OF LEGACY HAZARDOUS AND NUCLEAR INDUSTRIAL SITES PERSPECTIVES FROM HANFORD
Arm, S.T. and H.P. Emerson (eds.) CRC Press Boca Raton, ISBN 9781003329213, 280 pp, 2024

This book provides an overview of the key elements involved in remediating complex waste sites using the Hanford nuclear site as a case study. It is aimed at a non-technical audience and describes the stages of remediation based on general RCRA/CERCLA processes, from establishing a strategy that includes all stakeholders to site assessment, waste treatment and disposal, and long-term monitoring. The book also:

- Informs a non-technical audience of the important elements involved in complex waste site remediation.
- Employs the Hanford site as a case study throughout to explain real-world applications of remediation steps.
- Connects the "human" element to the technical aspects through interviews with key current and retired individuals at the Hanford site.
- Includes discussion of stakeholders and the engagement process in remediation.
- Demonstrates how all elements of complex waste site remediation, from demolition of buildings to groundwater management, are interrelated.
- Focuses on broader technical and sociopolitical challenges for the remediation of a contaminated site.

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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