Technology Innovation News Survey

Entries for January 1-15, 2024

Market/Commercialization Information

FUSRAP REMEDIATION SERVICES (PRESOL)
U.S. Army Corps of Engineers, North Atlantic Division, Philadelphia District, Philadelphia, PA
Contract Opportunities on SAM.gov W912BU24R0017, 2024

When this solicitation is released on or about February 7, 2024, it will be competed as a total small business set-aside. The United States Army Corps of Engineers intends to award a five-year indefinite delivery/indefinite quantity (IDIQ) single award task order contract (SATOC) to include the remediation of the Formerly Utilized Sites Remedial Action Program (FUSRAP) site located at the Former DuPont Chambers Works site in Deepwater, New Jersey. The Scope of Work (SOW) for the SATOC includes the removal of radioactively contaminated soil and ancillary groundwater from Areas of Concern at the Chambers Works property in accordance with the Record of Decision (ROD) and Explanation of Significant Differences. Remediation services may also include other identified contaminated areas at the DuPont Site as a result of ongoing investigation work. Constituents of concern are uranium, thorium, and radium; specifically, 234U, 235U, 238U, 230Th, and 226Ra. The Government intends to award a firm-fixed-price contract to the responsible offeror whose proposal conforms to the terms of the RFP notice, is determined fair and reasonable, and offers the best overall value to the Government as determined through the Best Value Trade-off process (FAR 15.101-1). Offerors should review the entire solicitation once it is posted. Information within this pre-solicitation notice is subject to change. https://sam.gov/opp/d55f863f36894397aafdf76f7589dca6/view

ENVIRONMENTAL CONSULTING SERVICES SATOC (PRESOL)
U.S. Army Corps of Engineers, Savannah District, Savannah, GA
Contract Opportunities on SAM.gov W912HN24R1003, 2024

When this solicitation is released on or about February 14, 2024, it will be competed as a total small business set-aside under NAICS code 541620. The U.S. Army Corps of Engineers, Savannah District, plans to issue a solicitation for a $10M Environmental Consulting Services (ECS), Single Award Task Order contract (SATOC). This acquisition is being offered as a 100% set-aside for small business competition and will result in a Firm Fixed Price Contract Award. The environmental and base support services under this contract will consist of environmental compliance, environmental restoration, environmental conservation, UXO anomaly avoidance, pollution prevention, real estate, SRM, energy management and sustainability services. The contractor shall provide support related to requirements of RCRA, CERCLA, the Clean Air Act, National Environmental Policy Agency (NEPA) and other related Federal Programs in addition to State/Local specific regulations/requirements. Contractors will be evaluated using the Lowest Price Technically Acceptable Methodology based on Price, Technical Approach, and Past Performance. https://sam.gov/opp/644248e8fbf447b18bcc49f30d1e0813/view

A -- ENVIRONMENTAL SECURITY TECHNOLOGY CERTIFICATION PROGRAM (ESTCP) -- ENVIRONMENTAL TECHNOLOGY DEMONSTRATIONS BASE BROAD AGENCY ANNOUNCEMENT (BAA) (PRESOL)
U.S. Army Corps of Engineers, Humphreys Engineer Center Support Activity, Alexandria, VA
Contract Opportunities on SAM.gov W912HQ24S0003, 2024

When the solicitation is released, it will be competed as a full and open competition; both small business and other than small business (including non-profits and educational institutions) are encouraged to respond under NAICS code 541715. ESTCP is DoD's demonstration and validation program for environmental and installation energy technologies. The ESTCP Office is interested in receiving pre-proposals for innovative technology demonstrations that address DoD environmental and installation energy requirements as candidates for funding. This notice constitutes a Broad Agency Announcement (BAA) as contemplated in FAR 6.102(d)(2). Readers should note that this is an announcement to declare ESTCP's intent to competitively fund demonstration projects as described in the Program Announcement on the ESTCP website. No electronic mail, faxed, or hard copy proposals will be accepted. Awards will take the form of contracts. Awardees under this BAA will be selected through a multi-stage review process. The pre-proposal review step allows interested organizations to submit technology demonstrations for Government consideration without incurring the expense of a full proposal. Based upon the pre-proposal evaluation by ESTCP, each of the pre-proposal submitters will be notified as to whether ESTCP requests or does not request the submission of a full proposal. The Program Announcement and complete submittal instructions are found at https://www.serdp-estcp.org/workingwithus. Pre-proposals are due no later than 2:00 PM EST on March 7, 2024. https://sam.gov/opp/59dd564eac36492cb67e5a2dda335e65/view

F -- WHITTIER, ALASKA ENVIRONMENTAL REMEDIATION SERVICES (PRESOL)
U.S. Department of Defense Logistics Agency, DLA Energy, Fort Belvoir, VA
Contract Opportunities on SAM.gov SPE60324R0503, 2024

When this solicitation is released on or about March 8, 2024, it will be competed as a total small business set-aside under NAICS code 562910. The Defense Logistics Agency (DLA) Energy anticipates issuing a Request for Proposal (RFP) to perform environmental remediation services at Whittier, Alaska. The requirements for Whittier, Alaska, include the operation and maintenance (O&M) of the remediation system. The period of performance is a four-year base period from September 11, 2024, through September 10, 2028, and a six-month extension provision from September 11, 2028, through March 9, 2029. The Government anticipates awarding one firm fixed-priced contract. This is not an RFP or a promise by the Government to pay for information received in response to this synopsis or any subsequent announcement. This information is subject to modification and in no way binds the Government to award a contract.https://sam.gov/opp/2c305cc5072f408c8ad1a5903c7eabd1/view

Cleanup News

PUGET SOUND SEDIMENT CLEANUP REMEDY EFFECTIVENESS RETROSPECTIVE
Patmont, C. and R. Healy. Integrated Environmental Assessment and Management [published online 31 January 2024 before print]

Five completed Puget Sound sediment remediation case studies (Bellingham Bay, St. Paul Waterway, Eagle Harbor, Hylebos Waterway, and Sinclair Inlet) that employed particularly robust remedy effectiveness monitoring programs spanning decades, are reviewed, revealing common lessons for improving remediation outcomes. 1) Though sediment remediation can play an important role in reducing contaminant exposure in areas with higher sediment concentrations, sediment links with fish tissue concentrations diminish at lower levels. As water column exposure from diverse sources becomes predominant, remediating sediments with lower concentrations yields proportionately less risk reduction. 2) Timely monitoring of effective source controls achieving substantial (i.e., >80%) contaminant source load reductions and large-scale capping projects have revealed rapid changes in Puget Sound surface sediment concentrations and biological recovery metrics with an average recovery half-time of 1.6±0.8 years. The weight of evidence suggests that natural recovery of Puget Sound surface sediments is significantly accelerated by exchange across the sediment-water interface from benthic organism feeding behaviors, porewater flux, and tide-generated currents. As a result, effective source controls in Puget Sound have rapidly improved surface sediment quality and achieved more significant risk reductions than broadscale sediment remediation. Moving forward, comprehensive source control efforts that incorporate robust monitoring in an adaptive management framework are the best way to achieve protective remediation objectives.
https://setac.onlinelibrary.wiley.com/doi/epdf/10.1002/ieam.4890

CHLORINATED SOLVENT DAUGHTER PRODUCT MANAGEMENT AND EXPEDITED REMEDIATION
Mazzarese, M. I SMART Remediation 25 January, Toronto, Canada, abstract only, 2024

This presentation reviews two sites where activated carbon impregnated with metallic iron, a complex carbohydrate, a facultative microbial consortium designed to degrade chlorinated solvents, and a second microbial consortia designed to break down the polymeric carbohydrate to monomeric fragments were mixed and applied via in situ injection. This synergistic combination was shown to generate significantly fewer daughter products and to degrade parent and daughter products completely to ethylene in an expedited timeframe compared to traditional enhanced reductive dechlorination (ERD) approaches. A combined remedial strategy was implemented to treat elevated levels of TCE in a shallow fine-grained aquifer at a former large industrial facility (Site 1). This remediation effort was comprised of ISCO to treat the shallow, mostly unsaturated soil mass; a metallic iron-impregnated activated carbon PRB installed downgradient of the source to manage the flux of dissolved mass offsite; and source area treatment with the activated carbon technology combination and microbial consortia. Total chlorinated ethylene (TCE+DCE+VC) concentrations in the source area were reduced by 99.9% in< three years. DCE and VC concentrations peaked ~six months post-application and have since declined to 21 ppb and 9.4 ppb, respectively. A multi-year phased approach was utilized to remediate a comingled plume at a former chemical plant (Site 2) that stored, repackaged, and distributed a multitude of chemicals, including hydrogen peroxide, methylisobutyl carbinol (MIBC), PCE, acetone, ethanol, and diesel fuel. The first phase used a combination of ex situ and in situ remediation methods that were selected to achieve site cleanup goals in specific plume areas of immediate concern. The initial total chlorinated ethylene (PCE+TCE+DCE+VC) concentrations were >213,000 ppb with much of the mass as DCE (72%). After 1 ½ years of source area treatment, the total concentration was 354 ppb, with 25% being DCE and the balance as VC. After demonstrating mass flux control over nine years with a PRB, and significant groundwater mass reductions in the source area, managed closure status was requested and is pending approval by the regulatory agency. *See presentation from virtual webinar in 2023* https://www.youtube.com/watch?v=ykzgTa5I4xk

NATURAL SOURCE ZONE DEPLETION ASSESSMENT: UK LARGE-SCALE FIELD CASE STUDY
CL:AIRE's Concawe bulletin CON 02, 8 pp, 2023

A study was undertaken to quantify Natural Source Zone Depletion (NSZD) rates from a stable LNAPL plume at a large operational facility. The quantification of NSZD rates was designed to allow the consideration of an 'attenuation-based' remedial option for both LNAPL and dissolved phase constituents. NSZD can potentially represent a highly sustainable remedial option in favorable scenarios. To formalize the sustainability benefits, an 'attenuation-based' approach, in this case implementing NSZD, was assessed against an alternative remedial option through qualitative comparison against the 15 headline indicators from the UK Sustainable Remediation Forum. This case study summarizes the project context and conceptual site model that supported the consideration of NSZD as a potential remedial solution as well as the sustainability assessment completed. Key aspects of the approach to dialogue with key stakeholders, including the client and Environment Agency, are also presented. https://www.claire.co.uk/component/phocadownload/category/109-concawe?download=965:concawe-bulletin-con02

SUSTAINABLE IN SITU THERMAL REMEDIATION
CL:AIRE's Concawe bulletin CON 03, 6 pp, 2023

Impacts from petroleum hydrocarbons and chlorinated solvents, originating from multiple point sources, were identified in subsurface soil and groundwater at an active manufacturing facility in a mixed commercial/residential area. Remedial actions included installing and operating a pump and treat (P&T) system to extract impacted groundwater from underlying chalk deposits. After operating the system for over a decade, it became clear that mass recovery had declined to levels where further operation would not have been sustainable. Since significant contaminant mass remained, additional site characterization and a revised sustainability-focused remedial options evaluation were carried out. These activities led to the replacement of the P&T system with a source treatment approach using in situ thermal remediation (ISTR) to remediate the identified source zone, within a warehouse building. This solution was implemented following a sustainability-based options appraisal that was then enhanced by the identification and incorporation, where feasible, of Best Management Practices in the system design and operational phases. Particular focus was placed on power consumption optimization. https://www.claire.co.uk/component/phocadownload/category/109-concawe?download=966:concawe-bulletin-con03

Demonstrations / Feasibility Studies

PUMP-AND-TREAT (P&T) VS GROUNDWATER CIRCULATION WELLS (GCW): WHICH APPROACH DELIVERS MORE SUSTAINABLE AND EFFECTIVE GROUNDWATER REMEDIATION?
Ciampi, P., C. Esposito, E. Bartsch, E.J. Alesi, M.P. Papini.
Environmental Research 234:116538(2023)

This study provides a quantitative comparative analysis of the performance of an alternative system to traditional pump & treat (P&T) to support the development of sustainable groundwater remediation plans at two industrial sites contaminated with DNAPL and As, respectively. At both locations, decade-long attempts were made to remediate groundwater contamination using P&T. Persistently high levels of contaminants led to the installation of groundwater circulation wells (GCWs) to explore the possibility of accelerating the remediation process in unconsolidated and rock deposits. A comparative evaluation focused on the different mobilization patterns observed, resulting in variations in contaminant concentration, mass discharge, and volume of extracted groundwater. A geodatabase-supported conceptual site model (CSM) was utilized as a dynamic and interactive interface to facilitate the fusion of multi-source data, including geological, hydrological, hydraulic, and chemical information, and enable the continuous extraction of time-sensitive information. Using this approach, the performance of GCW and P&T at the investigated sites was assessed. At Site 1, the GCW stimulated microbiological reductive dichlorination and mobilized significantly higher 1,2-DCE concentrations than P&T, despite recirculating a smaller volume of groundwater. At Site 2, the As removal rate by GCW was generally higher than pumping wells. One conventional well mobilized higher masses of As in the early stages of P&T, reflecting P&T's impact on accessible contaminant pools in early operational periods. P&T withdrew a significantly larger volume of groundwater than the GCW. The outcomes show the diverse contaminant removal behavior characterizing two distinct remediation strategies in different geological environments, revealing the dynamics and decontamination mechanisms that feature GCWs and P&T and emphasizing the limitations of traditional groundwater extraction systems in targeting aged contamination sources.
https://www.sciencedirect.com/science/article/pii/S0013935123013427/pdfft?md5=e081ff9735bcc1285cd4e33109fa0a29&pid=1-s2.0-S0013935123013427-main.pdf

FIELD TEST OF THERMALLY ACTIVATED PERSULFATE FOR REMEDIATION OF PFASS CO-CONTAMINATED WITH CHLORINATED ALIPHATIC HYDROCARBONS IN GROUNDWATER
Ding, X., C. Wei, Y. Wei, P. Liu, D. Wang, Q. Wang, X. Chen, and X. Song.
Water Research 249:120993(2024)

A study investigated the effects and mechanisms of PFAS degradation by in situ thermally activated persulfate (TAP) at a PFAS-chlorinated aliphatic hydrocarbons (CAH) contaminated site. The target temperature of 40.0-70.0°C was achieved in groundwater, and persulfate was effectively distributed in the demonstration area, which ensured PFAS and CAH co-contaminant degradation by in situ TAP. The reduction of PFCA concentrations in all monitoring wells was 43.7%-66.0% by in situ TAP compared to those maximum rebound values in groundwater, whereas no effective PFSA degradation was observed. The conversion of perfluoroalkyl acids (PFAAs) precursors was one of the main factors leading to increased PFCA concentrations in groundwater. CAHs were effectively degraded in most monitoring wells, and no inhibitory effects of CAHs and Cl^- on the degradation of PFAS were observed due to a sufficient amount of persulfate. Additionally, there were significant increases in SO_4^{2-} concentrations and reductions of pH values in groundwater due to in situ TAP, warranting their long-term monitoring in groundwater. The integrated field and lab investigations demonstrated that PFCA and CAH concentrations can be reduced by the oxidative degradation of in situ TAP.

ENHANCED LNAPL NATURAL SOURCE ZONE DEPLETION BY SOLAR-POWERED BIOVENTING AT THE FORMER GUADALUPE OIL FIELD
Eichert, J., C. Smith, E. Daniels, and N. Sihota. I 2023 Bioremediation Symposium Proceedings, 8-11 May, Austin, TX. 15 slides, 2023

NSZD via aerobic biodegradation of hydrocarbons, including methane, was demonstrated in the deep vadose zone at the former Guadalupe Oil Field (2002 data collection). Recent CO2 efflux measurements and subsurface temperature profiling confirmed that NSZD continues at similar rates. The same data collection methods are now being used to assess whether delivery of additional air via solar-powered bioventing significantly increases the NSZD rate. The blower injects air to a 4-inch diameter well screened across and ~ 8 ft above the water table. A packer is installed to the top 2 ft of the well screen to target air injection to the LNAPL smear zone immediately above the water table. Instrumentation is arranged radially from the injection well to a lateral distance of 125 ft, including CO2 efflux measurements (5 rays at 25 ft spacing), subsurface temperature monitoring pipes (1 ray at 25 ft spacing), and nested vapor wells (1 ray at 50 ft spacing). These methods also collect background and smear zone untreated comparison data. The solar panels have operated the blower at 31 cfm for an average of ~10 hours daily. Oxygen distribution has increased substantially, including elevated concentrations ~75 ft from the injection well. CO_2 effluxes have also increased in the test area, and the calculated NSZD rate is now ~2 times higher than that measured in the smear zone untreated comparison area. Subsurface temperature profiling corroborates an approximate doubling of the NSZD rate. Together, the data support an interpretation of oxygen-limited hydrocarbon biodegradation under natural conditions that can be enhanced by renewably powered bioventing. Based on the success of this pilot testing, expansion of a bioventing system across larger areas of the site is currently undergoing a sustainability analysis.
Slides: https://www.battelle.org/docs/default-source/hidden/2023-bio-symp-presentations/track-c/c1_1030_145_eichert_pptx.pdf?sfvrsn=15eb52e8_3
Longer abstract: https://www.battelle.org/docs/default-source/hidden/2023-bio-symp-abstracts/145_pdf2sfvrsn=86819814_3

Research

PEROXYMONOSULFATE-BASED ELECTROCHEMICAL ADVANCED OXIDATION: COMPLICATION BY OXYGEN REDUCTION REACTION
Lim, H.J., D.J. Kim, K. Rigby, W. Chen, H. Xu, X. Wu and J.H. Kim.
Environmental Science & Technology 57(47):19054-19063(2023)

This study presents a demonstration of the critical role played by the oxygen reduction reaction in the effective utilization of peroxymonosulfate (PMS) and the subsequent enhancement of overall pollutant remediation. The concurrent generation of H2O2 via oxygen reduction during the cathodic PMS activation by a model nitrogen-doped carbon nanotube catalyst was observed. A complex interplay between H_2O_2 generation and PMS activation, as well as a locally increased pH near the electrode due to the oxygen reduction reaction, resulted in a $SO_4^{\bullet-}/{}^{\bullet}OH$ mixed oxidation environment that facilitated pollutant degradation. Findings highlight a unique dependency between PMS-driven and H_2O_2-driven EAOPs and a new perspective on a previously unexplored route for further enhancing PMS-based treatment processes.

MULTI-LABORATORY VALIDATION STUDY FOR ANALYSIS OF PFAS BY EPA DRAFT METHOD 1633
Willey, J., A. Hanley, R. Anderson, A. Leeson, and T. Thompson. SERDP Project ER19-1409, 2024

The overarching goal of this project conducted by the DoD and EPA was to establish a standardized analytical method for PFAS in various environmental matrices, including groundwater, surface water, soils, sediment, landfill leachate, municipal wastewater, tissue, and biosolids (i.e., municipal wastewater treatment plant residuals). A single-laboratory study and a multi-laboratory study were completed with a focus on generating the necessary data to document the precision and accuracy of the analytical method for quantitation of PFAS in environmental media. The lab validation study was conducted as a single-lab validation before a multi-lab validation was conducted. The multi-lab study was conducted in several phases:

- Validation for wastewater, surface water, and groundwater (Volume I)
- Soils and Sediments (Volume II)
- Landfill Leachates and Biosolids (Volume III)
- Tissue (Volume IV)

The results for all reports but the landfill leachates support the finding that EPA Method 1633 measures PFAS concentrations as well as or better than most EPA methods for similar-sized organic contaminants in real-world samples of these

matrices. The landfill leachate results demonstrate the ability of the method to adequately measure PFAS concentrations in real-world landfill leachate and biosolids samples. However, the mean % recovery of PFDoS (48.9%) in spiked biosolid samples across all six labs indicated recovery of this analyte in biosolids samples may be biased low. Ongoing precision and recovery standards (OPR) and low-level OPR (LLOPR) data associated with biosolids sample results for PFDoS should be considered when determining the usability of biosolids sample data for PFDoS.
Single-lab validation results: https://serdp-estcp-storage.s3.us-gov-west-1.amazonaws.com/s3fs-public/documents/Single-Laboratory_Validation_Study_Report.pdf
Volume I:
https://serdp-estcp-storage.s3.us-gov-west-1.amazonaws.com/s3fs-public/2023-12/ER19-1409%20Multi-Laboratory%20Validation%20Study%20Report%20%28Volume%20I%29_0.pdf?VersionId=x4OmfvkN4i2PuIZwt6DlHSEQqn8.ohPf
Volume I Appendices:
https://serdp-estcp-storage.s3.us-gov-west-1.amazonaws.com/s3fs-public/2023-12/ER19-1409%20Multi-Laboratory%20Validation%20Study%20Report%20Appendices%20%28Volume%20I%29.pdf?VersionId=frDHIUe_t0i9.y_4YAE1UEE6y3p07V
Volume II:
https://serdp-estcp-storage.s3.us-gov-west-1.amazonaws.com/s3fs-public/2024-01/ER19-1409%20Multi-Laboratory%20Validation%20Study%20Report%20%28Volume%20II%29.pdf?VersionId=qhcE42IEF6l4PxpXbB6_yeEtyHwk7YMB
Volume III:
https://serdp-estcp-storage.s3.us-gov-west-1.amazonaws.com/s3fs-public/2024-01/ER19-1409%20Multi-Laboratory%20Validation%20Study%20Report%20%28Volume%20III%29.pdf?VersionId=juRtZCCaZb6WfH6LV8HA7TSzfXG9dk29
Volume IV:
https://serdp-estcp-storage.s3.us-gov-west-1.amazonaws.com/s3fs-public/2024-01/ER19-1409%20Multi-Laboratory%20Validation%20Study%20Report%20%28Volume%20IV%29.pdf?VersionId=zsp36H37k08a0dvH4tLg1AVeM1Fr2PiB

ATTENUATION OF PFOS IN FISH FROM A CONTAMINATED LAKE IN MICHIGAN
Schoen, L., D. Endicott, and D. McCauley. I 2023 Great Lakes PFAS Summit, 5-7 December, virtual, 39 minutes, 2023

PFAS was sampled in water, sediment and biota from Kent Lake in Michigan and Proud Lake (a reference lake) in 2021 to determine if contaminated sediments are a source of PFAS to aquatic food webs. Biota (predator fish, forage fish and benthos) were collected from both lakes and analyzed as whole-body composites for a suite of 36 PFAS analytes. Results of sampling and analysis are presented, including partition coefficients and bioaccumulation factors, as well as the patterns of PFAS contamination between the water, sediment and biota samples, which suggest that PFAS in the sediment may act as an ongoing source of contamination to the biota.
https://us06web.zoom.us/rec/play/L4Y_L0sEbdZEh1Cbp9bpVl-M8lxxVDcVa0l6Hp_aQvPgIWBT6Lzmzczh1rTQpU-MpXXBs4mKbbEFeA.z1ZvSe1m4TsF13Ki?canPlayFromShare=true&from=share_recording_detail&continueMode=true&componentName=

LARGE-SCALE ARSENIC MOBILIZATION FROM LEGACY SOURCES IN ANOXIC AQUIFERS: MULTIPLE METHODS AND MULTI-DECADAL PERSPECTIVES
Cao, F., D.B. Kleja, C. Tiberg, and J. Jarsjo.
Science of The Total Environment 892:64565(2023)

A multi-method investigation, including inverse transport modeling, in situ As concentration measurements in paired samples of soil and groundwater, and batch equilibrium experiments combined with geochemical modeling was conducted to study the mobilization and transport of As from anthropogenic sources. A case study used a unique 20-year series of spatially distributed monitoring data, capturing an expanding As plume in a chromated copper arsenate-contaminated anoxic aquifer in southern Sweden. Results showed a high variability in local K_d values of As (1 to 107 L/kg), implying that over-reliance of data from only one or a few locations can lead to interpretations inconsistent with field-scale As transport. The geometric mean of the local K_d values (14.4 L/kg) showed high consistency with the independently estimated field-scale effective K_d derived from inverse transport modeling (13.6 L/kg). This provides empirical evidence for using geometric averaging when estimating large-scale "effective K_d" values from local measurements within highly heterogeneous, isotropic aquifers. The studied As plume, prolonged by about 0.7 m/yr, is starting to extend beyond the borders of the industrial source area, a problem likely shared with many As-contaminated sites. In this context, geochemical modeling assessments can provide a unique understanding of the processes governing As retention, including local variability in, e.g., Fe/Al-(hydr)oxides contents, redox potential and pH. https://www.sciencedirect.com/science/article/pii/S0048969723031868/pdfft?md5=6390735da08790bf0fa5180738b20aaa&pid=1-s2.0-S0048969723031868-main.pdf

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) IN UNITED STATES TAPWATER: COMPARISON OF UNDERSERVED PRIVATE-WELL AND PUBLIC-SUPPLY EXPOSURES AND ASSOCIATED HEALTH IMPLICATIONS
Smalling, K., K.M. Romanok, P.M. Bradley, M.C. Morriss, J.L. Gray, L.K. Kanagy, S. Gordon, B. Williams, S. Breitmeyer, D. Jones, L.A. DeCicco, C. Eagles-Smith, and T. Wagner.
Environment International 178:108033(2023)

Human PFAS exposures in unregulated private wells and regulated public-supply tapwater were compared in a national reconnaissance study. Tapwater from 716 locations (269 private wells; 447 public supply) across the U.S. was collected from 2016-2021, including three locations where temporal sampling was conducted. PFAS concentrations were assessed by three labs and compared with land-use and potential-source metrics to explore contamination drivers. The number of individual PFAS observed ranged from 1 to 9 (median: 2), with corresponding cumulative concentrations (sum of detected PFAS) ranging from 0.348 to 346 ng/L. Seventeen PFAS were observed at least once, with PFBS, PFHxS, and PFOA observed most frequently in ~15% of the samples. Across the U.S., PFAS profiles and estimated median cumulative concentrations were similar among private wells and public-supply tapwater. At least one PFAS could be detected in ~45% of drinking water samples. These detection probabilities varied spatially with limited temporal variation in concentrations/numbers of PFAS detected. Benchmark screening approaches indicated potential human exposure risk was dominated by PFOA and PFOS, when detected. Potential source and land-use information was related to cumulative PFAS concentrations and the number of PFAS detected; however, corresponding relations with specific PFAS were limited, likely due to low detection frequencies and higher detection limits. The information generated supports the need for further assessments of cumulative health risks of PFAS as a class and in combination with other co-occurring contaminants, particularly in unmonitored private wells where information is limited or unavailable.

General News

TECHNOLOGY GUIDANCE FOR SENTINEL™ PASSIVE PFAS SAMPLERS OSORB®MEDIA USE IN PFAS PASSIVE SAMPLERS
Divine, C. and P. Edmiston. SERDP Project ER20-1127, 25 pp, 2022

This Technical Guidance describes the collection of surface water and groundwater samples using the Sentinel passive sampling device being developed for PFAS in environmental waters. The sampler design is simple and robust, using an organosilica resin modified with cross-linked amine polymer in a high-density polyethylene housing with polypropylene mesh. The addition of amine groups as a weak ion exchange resin in combination with Cu $^{2+}$ was designed to promote binding of short-chain PFAS compounds. Passive sampler uptake rates were relatively constant in lab tests even under extreme ionic strength conditions and natural organic matter concentrations, indicating potential applicability to a wide range of environmental water types. Integrative performance for most analytes showed a linear response to concentration with time (except for perfluorobutanoic acid and perfluoropentanoic acid), simplifying the calculation of aqueous concentrations. Sampling times as short as 3 days were necessary to reach the https://serdp-estcp-storage.s3.us-gov-west-1.amazonaws.com/s3fs-public/2023-12/ER20-1127%20Technical%20Guidance.pdf?VersionId=34bFzHz68_uzd_vzGAFtnyxHHH5sZoRx

CURRENT AND EMERGING TECHNOLOGIES FOR THE REMEDIATION OF DIFFICULT-TO-MEASURE RADIONUCLIDES AT NUCLEAR SITES
Hemming, S.D., J.M. Purkis, P.E. Warwick, and A.B. Cundy.
Environmental Science Processes & Impacts 25:1909-1925(2023)

Recent developments to remediate selected problem difficult-to-measure radionuclides (DTMRs) (*129*I, *99*Tc, *90*Sr, and *3*H), are reviewed, with a focus on industrial and site-scale applications. Pump and treat is the most used technique despite efficacy issues for *129*I and 3H. Permeable reactive barriers are less invasive but have only been demonstrated to remove 99Tc and *90*Sr at scale. Phytoremediation shows promise for site-scale removal of 3H but is unsuitable for *129*I and 99Tc due to biotoxicity and bioavailability hazards, respectively. No single technique can remediate all DTMRs of focus. There has also been no successful site-applied technology with high removal efficiencies for iodine species typically present in groundwaters (iodide/I^-, iodate/IO_3^- and organoiodine). Further work is needed to adapt and improve current techniques to field scales, as well as additional research into targeted application of emerging technologies.
https://pubs.rsc.org/en/content/articlepdf/2023/em/d3em00190c

PHYSICS-INFORMED SURROGATE MODELING FOR SUPPORTING CLIMATE RESILIENCE AT GROUNDWATER CONTAMINATION SITES
Wang, L. and L. Berkeley. I The Remplex Virtual Global Summit, 14-16 November, 19 slides, 2023

An innovative method was devised utilizing the U-Net Enhanced Fourier Neural Operator (U-FNO), a physics-informed machine learning technique, to generate rapid surrogate models for flow and transport. The models can forecast groundwater pollution levels under diverse climatic situations and subsurface characteristics without the use of a supercomputer. The research centered on DOE's Savannah River Site F-Area and established two time-dependent structures, U-FNO-3D and U-FNO-2D. Both frameworks incorporated a tailored loss function comprising data-driven factors and physical boundary limitations. Findings indicate that the FNO and U-FNO models can consistently foresee spatial-temporal fluctuations in groundwater flow and pollutant transportation properties, such as contaminant concentration, hydraulic head, and Darcy's velocity. The research reveals that the U-FNO-2D architecture is especially adept at predicting the effects of alterations in recharge rates on groundwater contamination sites, delivering superior time-dependent forecasts compared to the U-FNO-3D structure. The novel approach may revolutionize environmental monitoring and remediation efforts by providing rapid, precise, and cost-efficient estimations of groundwater pollution levels under uncertain climate conditions.
https://www.pnnl.gov/sites/default/files/2023-11/Remplex%20Submission%20110%20%20395.pdf

ADVANCES IN THE CHARACTERISATION AND REMEDIATION OF SITES CONTAMINATED WITH PETROLEUM HYDROCARBONS
Garcia-Rincon, J., E. Gatsios, R.J. Lenhard, E.A. Atekwana, and R. Naidu (eds). Springer International Publishing, ISBN 978-3-031-34446-6 ISBN 978-3-031-34447-3 (eBook), 675 pp, 2024

This open-access book focuses on the current state of practice of LNAPL characterization and remediation and seeks to provide information and a framework that would allow complexities to be better addressed by contaminated land practitioners, researchers, and regulators. https://library.oapen.org/viewer/web/viewer.html?file=/bitstream/handle/20.500.12657/86104/978-3-031-34447-3.pdf?sequence=1&isAllowed=y

PHOTODEGRADATION AND PHOTOCATALYSIS OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS): A REVIEW OF RECENT PROGRESS
Verma, S., B. Mezgebe, C. Hejase, E. Sahle-Demessie, and M. Nadagouda.
Next Materials 2, 100077(2023)

This review comprehensively summarizes previous reports on the photodegradation of PFAS with a special focus on photocatalysis. Challenges associated with these approaches and perspectives on the state-of-the-art approaches are also discussed, as well as the photocatalytic defluorination mechanism of PFOA and PFOS following complete mineralization.
https://www.sciencedirect.com/science/article/pii/S2949822823000771/pdfft?md5=8251f80e9599dd7948b350fd33295948&pid=1-s2.0-S2949822823000771-main.pdf

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