Technology Innovation News Survey

Entries for December 16-31, 2023

Market/Commercialization Information

FY24 GUIDELINES FOR TECHNICAL ASSISTANCE TO EXISTING AND POTENTIAL BROWNFIELDS REVOLVING LOAN FUND GRANT RECIPIENTS
Environmental Protection Agency, Funding Opportunity EPA-I-OLEM-OBLR-24-01, 2024

The purpose of this funding opportunity is to provide EPA Brownfield Revolving Loan Fund-specific technical assistance that focuses on the unique complexities of EPA Brownfield Revolving Loan Fund Grants with the goal of increasing the capacity of EPA-funded Brownfield Revolving Loan Fund Programs nationwide. This funding opportunity is intended to 1) help communities that have not previously engaged in brownfields projects to gain an understanding of requirements for managing a successful EPA Brownfield Revolving Loan Fund Program, and 2) build capacity for existing EPA Brownfield Revolving Loan Fund grant recipients, so that they can better manage their Revolving Loan Fund programs. The closing date and time for receipt of applications is March 1, 2024, at 11:59 p.m. ET. https://grants.gov/search-results-detail/351665

F -- MANSFIELD TRAIL DUMP SUPERFUND SITE OPERABLE UNIT 2 (SRCSGT)
U.S. Army Corps of Engineers, Northwestern Division, Kansas City District, Kansas City, MO
Contract Opportunities on SAM.gov W912DQ-24-RFI-MansfiledOU2, 2024

This is a sources sought notice for marketing research purposes only under NAICS code 562910. The U.S. Army Corps of Engineers, Northwestern Division, seeks to determine the availability of entities within the market to support an environmental remediation contract at the Mansfield Trail Operable Unit 2, Superfund Site in Stanhope, New Jersey. Participation in the Request for Information process is important in that it makes USACE decision-makers aware of the capabilities that exist in the market. Responses will be collected via the questionnaire only. Data collected from the responses will become the property of USACE and will be used to provide a snapshot of how businesses who participated are capable of providing service for the remediation at the Mansfield Trail Operable Unit 2. Responses to the questionnaire are due by 3:00 PM CST on February 15, 2024. https://sam.gov/opp/2d9f57a981d8450bbcb89d1b1216ac9f/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 under NAICS code 541715, 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. The Environmental Security Technology Certification Program (ESTCP) is the Department of Defense's (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 Federal Acquisition Regulation (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/59dd564eac36492cb67e5a24da335e65/view

Cleanup News

AIR FORCE PARTNERSHIP PIONEERS NEW PFAS SOIL TREATMENT TECHNOLOGY IN ALASKA
Veedmont, A. AFIMSC Public Affairs, Eielson Air Force Base, Published November 2, 2023

The Air Force Installation and Mission Support Center recently launched a large-scale soil washing effort at Eielson Air Force Base, Alaska. The project involves treatment and disposal of 130,000 cubic yards of PFAS-impacted soil excavated during a MILCON project to build infrastructure to house F-35A fighter squadrons. Two PFAS pilot studies conducted through ESTCP provided a site-specific comparison of the cost and performance for two viable technologies: soil washing and thermal desorption. Since project startup, Eielson's treatment plant has processed ~1,500 cubic yards of soil. During the field season (May through September) the operation is expected to treat 30 yd^3 soil/hr. The soil will be repurposed for other projects once it has been cleaned and deemed safe with no PFAS detection levels above Alaska regulatory standards.
https://www.eielson.af.mil/News/Features/Display/Article/3579883/air-force-partnership-pioneers-new-pfas-soil-treatment-technology-in-alaska/
See results from ESTPC pilot study: https://serdp-estcp-storage.s3.us-gov-west-1.amazonaws.com/s3fs-public/2023-05/ER20-5258%20Final%20Report.pdf?VersionId=i0EwhbzRomdHlbr4zeCyD0LstilzHTYe

OPTIMIZING REMEDIATION IN FRACTURED AND WEATHERED BEDROCK: LESSONS FROM SUCCESSFUL INJECTION PROJECTS
Dombrowski, P.M. | AEHS 39th Annual International Conference on Soils, Sediments, Water and Energy, 16-19 October, Amherst, MA, 20 slides, 2023

The focus of this presentation is a series of case studies of successful in situ remediation of contaminated bedrock zones, including an evaluation of project-specific objectives, remedial design, reagent selection, and injection methods. Particular attention was applied to the weathered bedrock zone between the overburden and competent bedrock and approaches for applying remediation in this area, where contaminant transport may be high. Strategies to enhance contaminant reduction in deeper competent bedrock were also discussed. Case studies included enhanced in situ dechlorination and in situ chemical oxidation applied at sites impacted by CVOCs and petroleum hydrocarbons. Supporting examples included cases where multiple amendments in sequence were applied into contaminated bedrock to provide short-term aggressive contaminant destruction and persistent treatment to achieve extended contaminant reduction and/or distribution of reagents post-injection.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File23333/Handout_218_1024100957.pdf

COMBINING BIOTIC AND ABIOTIC TREATMENT PROCESSES POST IN SITU THERMAL TREATMENT (ISTT)
Booth, G., D. Collins, R. Hogdahl and R. Simon. | 2023 Bioremediation Symposium Proceedings, 8-11 May, Austin, TX, 15 slides, 2023

This presentation discusses results from the combined implementation of in situ thermal treatment (ISTT) and in situ chemical reduction (ISCR)/in situ bioremediation (ISB) permeable reactive barriers (PRBs) at a site in the northeastern U.S. to remediate CVOCs in soil and groundwater. Multiple injected combined ISCR/in situ bioremediation (ISB) barriers were installed for the treatment of CVOCs (primarily TCE, up to 180 mg/L, cDCE up to ~90 mg/L, and VC up to ~4 mg/L) that migrated from a previously thermally-remediated source area. Sampling monitoring wells, high-resolution site characterization, and groundwater flow assessment identified the zones of highest mass flux. The PRBs were designed to intercept the groundwater plumes and provide a green and sustainable in situ remedy. Reagents were selected based on site-specific geochemistry and COCs, while the reagent dosing and placement were determined based on groundwater geochemical parameters (e.g., pH, ORP), groundwater flux, and reductive contaminant stoichiometry. The injected PRB barriers were installed to provide variable dosing of ISCR reagents and bioaugmentation culture to target contaminated groundwater migrating at defined depth intervals ranging from 10 to 57 ft bgs with abiotic and biotic chemical reduction processes while leveraging the post-thermal treatment heat migrating from the former source areas. Post-injection monitoring results from over 3 years indicate significant improvement in downgradient groundwater biogeochemical conditions and reductions in groundwater CVOCs. An analysis of the performance data, including groundwater biogeochemical parameters, groundwater temperature, and CVOC trends and distributions, is provided.
Slides: https://www.battelle.org/docs/default-source/hidden/2023-bio-symp-presentations/track-c/c7_1300_278_booth_aurey.pptx.pdf?sfvrsn=7cc9ea6_3
Longer abstract: www.battelle.org/docs/default-source/hidden/2023-bio-symp-abstracts/278.pdf?sfvrsn=fb033e09_3

Demonstrations / Feasibility Studies

LAGOON WATER/SOILS REMEDIATION OF PFAS -WHAT IS BETTER ACTIVATED CARBON OR PORTLAND?
Trigger, G., D. Cassidy, and C. Peters. | 2023 Great Lakes PFAS Summit, 5-7 December, virtual, 39 minutes, 2023

This presentation discusses lessons learned while pumping and treating 6.6M gallons of PFAS-contaminated water from a tight clay-lined lagoon and backfilling the lagoon with treated soil, sediments and phragmites using six different stabilizing binding agents to treat five different materials. The goal was to implement source control/source reduction to prevent PFAS releases over 12 ppt from reaching the nearby river. Data for each source and the performance of the six different binding agents based on samples collected at the time of treatment and from samples collected six months later are reviewed.
https://us06web.zoom.us/rec/play/0QhxoQ24oTUkLnJ-FYU-FBmFjpDf3Zoo8TeJM8pzoK-tpEfsy6_NDjOdAkySeFMZpaVehp7DnimS2Jhy.3XgKMX4Ho-_8DO6W?canPlayFromShare=true&from=share_recording_detail&continueMode=true&componentNar

MOBILIZATION PILOT TEST OF PCE SOURCES IN THE TRANSITION ZONE TO AQUITARDS BY COMBINING MZVI AND BIOSTIMULATION WITH LACTIC ACID
Puigserver, D., J. Herrero, and J.M. Carmona.
Science of the Total Environment 877:162751(2023)

A field pilot test was conducted at a site where DNAPL pools of PCE had accumulated in a transition zone. In particular, the interface with the bottom aquitard was where PCE concentrations were the highest. A combined strategy using ZVI in microparticles and biostimulation with lactate in the form of lactic acid was conducted. The coupled biotic and abiotic processes' interdependence generated synergies throughout the test, resulting in greater degradation of the PCE and its transformation products. Combining the two techniques was effective in mobilizing the contaminant source of PCE.
https://www.sciencedirect.com/science/article/pii/S0048969723013670/pdfft?md5=dfd61857e320c67de6561534ec28a752&pid=1-s2.0-S0048969723013670-main.pdf

PILOT-SCALE REMOVAL OF PFAS FROM CHROMIUM-PLATING WASTEWATER BY ANION EXCHANGE RESIN AND ACTIVATED CARBON: ADSORPTION DIFFERENCE BETWEEN PFOS AND 6:2 FLUOROTELOMER SULFONATE
Jiang, X., Z. Zhou, D. Wang, G. Liu, W. Wang, S. Mu, G. Yu, and S. Deng.
Chemical Engineering Journal 481:148569(2024)

The removal of PFAS from chromium-plating wastewater by granular activated carbon (GAC) and anion exchange resin (AER) was evaluated in a pilot-scale study. The breakthrough curves of PFOS and 6:2 FTS were similar in GAC columns but significantly different in AER columns, with PFOS and 6:2 FTS reaching 10% breakthrough at about 45,000 BV and 4,000 BV, respectively. The replacement of 6:2 FTS by PFOS and other coexisting organic substances resulted in the concentrations of 6:2 FTS in the AER effluent reaching up to 3.8 times the influent concentrations. Density functional theory calculations showed that the adsorption energy of PFOS on the AER quaternary amine group was more negative than that of 6:2 FTS, and the weak affinity of AER for 6:2 FTS was closely related to the solvent effect. A cost analysis determined that if 6:2 FTS becomes the target PFAS, AER adsorption will no longer have a cost advantage over GAC adsorption.

COMBINED ACTIVE AND PASSIVE IN SITU REMEDIATION APPROACH FOR HIGH CONCENTRATION METALS IN GROUNDWATER
King. T. | AEHS 39th Annual International Conference on Soils, Sediments, Water and Energy, 16-19 October, Amherst, MA, 26 slides, 2023

This presentation reviews results from the bench- and field pilot testing at a large-scale urban fill site in the northeast U.S. impacted with cadmium, copper, and zinc in the context of how the full-scale remediation approach was optimized. Multi-phased remediation technology bench-testing was performed on vadose and saturated source zone soil and groundwater. Geochemical stabilization of the metals in soil and groundwater was tested using variable doses of iron sulfide and calcium polysulfide reagents. Stabilization/solidification was tested by mixing Portland Cement with site soil. Treatment efficacy was evaluated by measuring post-treatment leachable metals, pH, and geotechnical properties. A decision matrix was used to holistically assess predesign investigation and bench-testing results to select a site remedy. Key considerations included reduction of mass flux in groundwater, geochemical effects, long-term performance, cost-effectiveness, resiliency, and sustainability. The selected remedial approach combined source area in situ remediation, soil stabilization/solidification via ISS, and down-gradient permeable reactive barriers applied in a phased and flexible manner. Bench-testing indicated that two to nearly three orders of magnitude concentration reduction of metals in groundwater and leachable metals could be achieved. The solidified/stabilized soils resulted in hydraulic permeabilities several orders of magnitude lower than adjacent site soil and sufficient geotechnical strength. The bench testing results were then scaled up to field pilot tests for soil and groundwater. An optimized full-scale approach was developed based on the pilot testing results. https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File23333/Handout_226_1018044149.pdf

Research

TREATMENT OF THE INSENSITIVE MUNITIONS COMPOUND, 3-NITRO-1,2,4-TRIAZOL-5-ONE (NTO), IN FLOW-THROUGH COLUMNS PACKED WITH ZERO-VALENT IRON
Yu, Y., R.A. Root, R. Sierra-Alvarez, J. Chorover and J.A. Field.
Environ Sci Pollut Res Int 30: 64606-64616

A study investigated the feasibility of applying zero-valent iron (ZVI) in a continuous-flow packed bed reactor to effectively remediate nitro-1,2,4-triazol-5-one (NTO). ZVI-packed columns treated an acidic (pH 3.0) or a circumneutral influent (pH 6.0) for 6 months (ca. 11,000 pore volumes [PVs]). Both columns effectively reduced NTO to the amine product 3-amino-1,2,4-triazol-5-one (ATO). The column treating the pH-3.0 influent exhibited prolonged longevity in reducing NTO, treating 11-fold more PVs than the column treating pH 6.0 influent until the breakthrough point (85% of NTO removed). The exhausted columns (only 10% of NTO removed) regained NTO-reducing capacity by reactivation using 1 M HCl, fully removing NTO. After the experiment, solid-phase analysis of the packed-bed material showed that ZVI was oxidized to iron (oxyhydr) oxide minerals such as magnetite, lepidocrocite, and goethite during NTO treatment. Results indicate that treatment in a ZVI-packed bed reactor can be an effective approach for the removal of NTO.

REMOVAL OF AQUEOUS URANYL AND ARSENATE MIXTURES AFTER REACTION WITH LIMESTONE, PO_4^{3-}, AND CA2
Meza, I., H. Hua, K. Gagnon, A. Mulchandani, J. Gonzalez-Estrella, P.C. Burns, A.S. Ali, M. Spilde, E. Peterson, P. Lichtner and J.M. Cerrato.
Environmental Science & Technology 57(49):20881-20892(2023)

A study investigated the simultaneous removal of aqueous uranyl and arsenate after the reaction with limestone and precipitated hydroxyapatite (HA_p, $Ca_{10}(PO_4)_6(OH)_2$). In benchtop experiments with an initial pH of 3.0 and initial concentrations of 1 mM U and As, uranyl and arsenate coprecipitated in the presence of 1 g/L limestone. Related experiments initiated under circumneutral pH conditions showed that uranyl and arsenate remained soluble. The addition of 1 mM PO_4^{3-} and 3 mM Ca^{2+} in solution (initial concentration of 0.05 mM U and As) resulted in the rapid removal of >97% of U via Ca-U-P precipitation. In experiments with 2 mM PO_4^{3-} and 10 mM Ca^{2+} at pH rising from 7.0 to 11.0, aqueous concentrations of As decreased (between 30 and 98%) circa pH 9. HA_p precipitation in solids was confirmed by powder X-ray diffraction and scanning electron microscopy/energy dispersive X-ray. Electron microprobe analysis indicated U was coprecipitated with Ca and P, while As was mainly immobilized through HAp adsorption. Results indicate that natural materials, such as HA_p and limestone, can effectively remove uranyl and arsenate mixtures.

IN SITU BIOMINERALISATION FOR SELLAFIELD GROUNDWATER RADIONUCLIDE REMEDIATION
Robinson, C., S. Shaw, J.R. Lloyd, J. Graham, J. Rothe, K. Dardenne, and K. Morris.
The Remplex Virtual Global Summit, 14-16 November, 24 slides, 2023

In this study, biotic (calcium citrate/sodium phosphate, glycerol phosphate) and abiotic (polyphosphate) phosphate in situ amendments were tested as radionuclide sinks using sediment microcosm and flowing column experiments. The goal was to extend the envelope of application of these techniques to a uranium and strontium-contaminated site in Sellafield, UK, using relevant sediment and groundwater. For U(VI) and stable Sr-challenged microcosms, aqueous geochemical results suggest adding phosphate-generating amendments enhanced Sr and U removal from solution when compared to the sediment-only sorption controls. After treating with phosphate amendments, microcosm sediment endpoints were taken for solid phase characterization techniques, including SEM and XAS. EXAFS analysis showed evidence for non-crystalline U(VI) phosphate and confirmed some Sr incorporation into Ca-phosphate precipitates. Further investigation was conducted using flowing column studies, designed to represent typical Sellafield groundwater flow regimes. The addition of phosphate-generating amendments decreased the Sr breakthrough rate compared to a sediment-only column. Post-treatment, columns were sectioned (bulk EXAFS) and resin embedded (µXRF; INE-beamline, KIT, Germany) to enable solid phase characterization. Bulk EXAFS analysis showed some evidence for Sr incorporated Ca-phosphate phases in treated columns. Initial analysis of µXRF data showed hot spots of Sr at the bases of treated columns. https://www.pnnl.gov/sites/default/files/2023-11/Remplex%20Submission%2060%20%20407.pdf

A COMPARISON OF TWO MACROINVERTEBRATE MULTI-PLATE SAMPLING METHODS TO INFORM GREAT LAKES MONITORING AND REMEDIATION EFFORTS
Yeardley, R., B. Duffy, K. Kimbrough, M. Mills, and E. Johnson. Journal of Environmental Protection 14(12):933-953(2023)

A multi-agency study was conducted to assess the contribution of seven major urban tributaries on the U.S. side of the river toward the impairment of the Niagara River to help guide remediation and restoration efforts at the Niagara River Great Lakes Area of Concern site. Macroinvertebrate communities were sampled using two co-located versions of Hester Dendy (HD) samplers: one used by the NY State Department of Environmental Conservation (NYSDEC) and another by EPA ORD. Samplers were deployed in tributaries in highly developed watersheds with a high percentage of impervious surfaces. The two sampling methods varied in terms of the number and size of plates, between-plate spacing, and deployment method. Comparison of the similarity/grouping of communities with multivariate ordination techniques, Nonmetric Multidimensional Scaling and Multi-Response Permutation Procedure, showed that both methods could detect differences in communities at stations, despite some grouping by month and method. The indices and metrics derived from the two HD methods gave comparable but not identical water quality assessments. Despite their differences, the methods were robust with respect to water quality categories derived from indices used nationally (HBI) and by NY state (BAP). For the common richness metrics, total taxa and EPT richness, there was no statistical difference between means from 3 samplings. Some metrics, especially percent tolerant collector-gatherer individuals, did show significant differences at certain stations. Indicator Species Analysis showed some taxa associated with each method. The observed community differences were likely due to the difference in sampler deployment position. https://www.scirp.org/pdf/jep_2023120516310166.pdf

FIELD CALIBRATION AND PAS-SIM MODEL EVALUATION OF THE XAD-BASED PASSIVE AIR SAMPLER FOR SEMI-VOLATILE ORGANIC COMPOUNDS
Li, Y., F. Zhan, Y.D. Lei, C. Shunthirasingham, H. Hung, and F. Wania.
Environmental Science & Technology 57(25):9224-9233(2023)

The XAD-passive air sampler (PAS) was calibrated using a styrene-divinylbenzene sorbent through a year-long side-by-side deployment with an active sampler to advance quantitative understanding of uptake kinetics. Twelve XAD-PASs were deployed in June 2020 and retrieved at 4-week intervals, while gas phase SVOCs were quantified in 48 consecutive week-long active samples taken from June 2020 to May 2021. Consistent with XAD's high uptake capacity, even relatively volatile SVOCs, such as hexachlorobutadiene, displayed linear uptake throughout the deployment. Sampling rates (SRs) range between 0.1 and 0.6 m^3/day for 26 SVOCs, including brominated flame retardants, organophosphate esters, and halogenated methoxylated benzenes. SRs were compared with experimental SRs reported previously. The ability of the existing mechanistic uptake model PAS-SIM to reproduce the observed uptake and SRs was evaluated. Agreement between simulated and measured uptake curves was reasonable but varied with compound volatility and the assumed stagnant air layer boundary thickness. Even though PAS-SIM predicted the SR range for the studied SVOCs, it failed to capture the volatility dependence of the SR by underestimating the length of the linear uptake period and not considering the kinetics of sorption.

ECOLOGICAL CHARACTERISTICS IMPACT PFAS CONCENTRATIONS IN A U.S. NORTH ATLANTIC FOOD WEB
Hedgespeth, M.L., D.L. Taylor, S. Balint, M. Schwartz, and M.G. Cantwell. Science of The Total Environment 880:163302(2023)

A comprehensive study characterized the presence and concentrations of 24 targeted PFAS across 18 marine species from Narragansett Bay, Rhode Island, and surrounding waters. These species reflect the diversity of a typical North Atlantic Ocean food web with organisms from various taxa, habitat types, and feeding guilds. Many organisms have no previously reported information on PFAS tissue concentrations. Significant relationships of PFAS concentrations with respect to various ecological characteristics, including species, body size, habitat, feeding guild, and collection location were found. Based upon the 19 PFAS detected, benthic omnivores (American lobsters = 10.5 ng/g ww, winter skates = 5.77 ng/g ww, Cancer crabs = 4.59 ng/g ww) and pelagic piscivores (striped bass = 8.50 ng/g ww, bluefish = 4.30 ng/g ww) demonstrated the greatest average ΣPFAS concentrations across all species sampled. American lobsters had the highest concentrations detected in individuals (ΣPFAS up to 21.1 ng/g ww, of primarily long-chain PFCAs). Calculations of field-based trophic magnification factors for the top eight detected PFAS determined that PFDA, PFOS, and FOSA associated with the pelagic habitat biomagnified. In contrast, PFTeDA associated with the benthic habitat demonstrated trophic dilution in this food web (calculated trophic levels ranged from 1.65 to 4.97). While PFAS exposure to these organisms may have adverse implications for ecological impacts via toxicological effects, many of these species are also key recreational and commercial fisheries resulting in potential for human exposure via dietary consumption.

General News

CONSIDERATION OF CLIMATE CHANGE AT CONTAMINATED GROUNDWATER SITES
EPA Office of Superfund Remediation and Technology Innovation, EPA 542-F-24-001, 7 pp, 2024

In October 2021, EPA released its updated Climate Adaptation Plan, which examines how EPA programs may be vulnerable to a changing climate and how the Agency can adapt in order to continue meeting its mission of protecting human health and the environment. Under the Superfund Program, existing processes for assessing and remediating contaminated sites provide a robust structure that enables consideration of climate changes such as increasing temperatures, decreasing precipitation and sea level rise. Examination of associated vulnerabilities is most effective through use of a place-based strategy due to wide variations in the hydrogeologic characteristics of sites, the nature of remediation systems operating at contaminated sites, and local or regional climate and weather regimes. https://www.epa.gov/system/files/documents/2024-01/consideration-of-climate-change-at-contaminated-groundwater-sites.pdf

MARKET RESEARCH STUDY: PFAS IN WASTEWATER
DOE Commercial Potential Evaluation Report, 87 pp, 2023

This report introduces the complex problem of PFAS at wastewater treatment plants and presents current and emerging methods for potential PFAS destruction. The report also discusses the wastewater treatment process in general, current methods of PFAS containment used by wastewater treatment plants, state initiatives and regulations, and themes in recent PFAS destruction research, including a survey of industry solutions that are either on the market or in the process of commercialization. https://science.osti.gov/-/media/sbir/pdf/Application_Resources/2023/CPE-PFAS-Final-Report.pdf

ADVANCES IN PFAS DESTRUCTION TECHNOLOGIES
Krause, M. P. Lemieux, and M. Crimi. AAAS Epi Center webinar, 120 minutes, 2022

In this webinar, expert panelists share the scientific evidence related to current and emerging PFAS destruction technologies to support decision-makers in their state or community. The webinar also provides an overview of destruction needs and challenges. https://www.youtube.com/watch?v=BMo4thSw894

MECHANISMS AND OPPORTUNITIES FOR RATIONAL IN SILICO DESIGN OF ENZYMES TO DEGRADE PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)
Marciesky, M., D.S. Aga, I.M. Bradley, N. Aich and C. Ng.
Journal of Chemical Information and Modeling 63(23):7299-7319(2023)

This review explores the use of in silico enzymatic design as a potential PFAS degradation technique. The scope of the enzymes included is based on currently known PFAS degradation techniques, including chemical redox systems, which have been studied for PFOS and PFOA defluorination, such as those that incorporate hydrated electrons, sulfate, peroxide, and metal catalysts. Bioremediation techniques, namely the laccase and horseradish peroxidase systems, are also discussed. The redox potential of known reactants and enzymatic radicals/metal complexes are then compared to potential enzymes for degrading PFAS. The molecular structure and reaction cycle of prospective enzymes are explored. Current knowledge and techniques of enzyme design, particularly radical-generating enzymes, and application are also discussed. Finally, potential routes for bioengineering enzymes to enable or enhance PFAS remediation and the future outlook for computational exploration of enzymatic in situ bioremediation routes for these highly persistent and globally distributed contaminants are considered.

20 YEARS OF EXPERIENCE USING PERSULFATE IN REMEDIATING SOIL AND GROUNDWATER – DO'S AND DON'TS
Pare, J. | RemTech 2023: Remediation Technologies Symposium 2023, 11-13 October, Banff, Alberta, Canada, 40 slides, 2023

This presentation revisits 20 years of learning and optimizing persulfate use for the chemical oxidation of organic contamination in soil and groundwater, covering the evolution of the technology to make it more effective and applicable in a broader range of soil and groundwater remediation applications. The first part of the presentation discusses selecting the proper activation mechanism and applying the persulfate in Na and high Sodium Adsorption Ratio aquifers. The presentation also covers the evolution of the technology and its use in:

- Combining in situ soil stabilization with in situ chemical oxidation
- Low solubility oxidant used as permeable reactive barrier media
- Combining in situ chemical oxidation and bioremediation

Complete case studies illustrate each of these evolutions to help determine the application range for the type of contaminant and geology for their use. Conclusions in the form of Do's and Don'ts close the presentation and guide the potential user to understand technology limitations under specific site conditions.
Slides: https://esaa.org/wp-content/uploads/2023/10/RT2023Pare-2.pdf
Longer abstract: https://esaa.org/wp-content/uploads/2023/09/RT2023-Abstracts-35.pdf

DEVELOPMENT OF A PFAS SCREENING TECHNIQUE FOR DRINKING WATER AND CONSUMER PRODUCTS
Jin, Y. | 2023 Great Lakes PFAS Summit, 5-7 December, virtual, 40 minutes, 2023

This presentation summarizes the development of a rapid-screening tool for adsorbable organic fluorine in groundwater and drinking water, which can also be used for various consumer products. Particle-Induced Gamma-ray Emission (PIGE) spectroscopy combined with a novel solid-phase extraction technique can provide a sensitive and economical solution to screen water samples for high fluorine content as a surrogate for PFAS. Adding a simple rinse to distinguish organic from inorganic and ultra-short-chain PFAS makes this tool practical for monitoring water supplies. Several examples of environmental samples and recent consumer product screening are provided.
https://us06web.zoom.us/rec/play/T2To5zSsxP3aaSQ65DGz9EOTNA-dckNWehdXD9qcFSY5rWH71dBVACPMYoXfqLV99MunsW60LqXUSSX6.4bXsybg4HpWv4rE8?canPlayFromShare=true&from=share_recording_detail&continueMode=true&componen

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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