Technology Innovation News Survey

Entries for March 1-15, 2023

Market/Commercialization Information

ENVIRONMENTAL SECURITY TECHNOLOGY CERTIFICATION PROGRAM (ESTCP) - ENVIRONMENTAL TECHNOLOGY DEMONSTRATIONS -- OPEN TOPICS BAA
U.S. Army Corps of Engineers, Humphreys Engineer Center Support Activity, Alexandria, VA
Contract Opportunities on SAM.gov, Solicitation W912HQ23S0005, 2023

When the solicitation is released, it will be competed as a full and open competition under NAICS code 541715. The Environmental Security Technology Certification Program (ESTCP) is DoD's demonstration and validation program for environmental and installation energy technologies. The ESTCP Office is interested in receiving white papers 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. There is no commitment by ESTCP to make any contract awards, nor to be responsible for any cost incurred by the offeror before a contract award is made. It is expected that multiple awards totaling approximately $10 million will result, depending on the availability of funds. The Program Announcement and complete submittal instructions are found at https://www.serdp-estcp.org/workingwithus. To be eligible for consideration, parties wishing to respond to this announcement must submit a white paper per the website's instructions. Awardees under this BAA will be selected through a multi-stage review process. The white paper review step allows interested organizations to submit technology demonstrations for Government consideration without incurring the expense of a full proposal. Based upon the white paper evaluation by ESTCP, each of the white paper submitters will be notified as to whether ESTCP requests or does not request the submission of a full proposal. As noted in the instructions on the ESTCP website, the evaluation criteria for white papers are Technical Merit and ESTCP Relevance. Each criterion is weighted equally. Due to the anticipated volume of white papers that will be received, the Government will not provide debriefs to those not requested to submit a full proposal. Instructions for preparing a full proposal will be provided at the time of notification. A request for submission of a full proposal does not indicate a decision has been made to make an award. Evaluation criteria for full proposals will include Cost/Benefit of Technology, Transition Potential, and Cost of Proposal in addition to the criteria above. https://sam.gov/opp/a3eed66272d44bc3994b3a8e34049968/view

STRATEGIC ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM (SERDP) -- OPEN TOPICS BAA (PRESOL)
U.S. Army Corps of Engineers, Humphreys Engineer Center Support Activity, Alexandria, VA
Contract Opportunities on SAM.gov, Solicitation W912HQ23S0005, W912HQ23S0007

When the solicitation is released, it will be competed as a full and open competition. The Department of Defense (DoD) Strategic Environmental Research and Development Program (SERDP) Office is interested in receiving white papers for research focusing on the areas of Environmental Restoration, Munitions Response, Resource Conservation and Resilience, and Weapons Systems and Platforms technologies. 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 DoD SERDP's intent to competitively fund research and development for environmental research that addresses the topic areas set forth in the Announcement. SERDP supports environmental research relevant to the management and mission of the DoD and supports efforts that lead to the development and application of innovative environmental technologies or methods that improve the environmental performance of DoD by improving outcomes, managing environmental risks, and/or reducing costs or time required to resolve environmental or resilience problems. The Program Announcement and complete submittal instructions are found on the DoD SERDP website at https://https://www.serdp-estcp.org/workingwithus. To be eligible for consideration, readers wishing to respond to this announcement must submit a white paper in accordance with all instructions on the SERDP website. This solicitation will remain open for approximately one (1) year from the date of publication, or until replaced by a successor BAA. No faxed or hard copy submissions will be accepted. Awardees under this BAA will be selected through a multi-stage review process. The white paper review step allows interested organizations to submit research white papers for Government consideration without incurring the expense of a full proposal. Based upon the white paper evaluation by SERDP, each of the white paper submitters will be notified as to whether SERDP requests or does not request the submission of a full proposal. As noted in the instructions on the SERDP website, the evaluation criteria for white papers are Technical Merit and SERDP Relevance. Each criterion is weighted equally. Due to the anticipated volume of white papers that will be received, SERDP will not provide debriefs on those that are not requested to submit a full proposal. https://sam.gov/opp/347dffd6a3ba493cb44e7b15e70817fc/view

F -- CANEY SUPERFUND SITE REMEDIAL ACTION (PRESOL)
U.S. Environmental Protection Agency, Region 7, Lenexa, KS
Contract Opportunities on SAM.gov, Solicitation 68HE0723R0032, 2023

When the solicitation is released on or about April 22, 2023, it will be competed as a hubzone small business set-aside under NAICS code 562910. EPA Region 7 is seeking the services of an experienced firm to provide Remedial Action (RA) services for the Caney Residential Yards Superfund Site, Operable Unit 1 Residential Properties, impacted by human transport of mine waste resulting from nearly two centuries of mining in Montgomery County, Kansas. The work to be performed under this contract consists of excavation, consolidation, disposal, and re-vegetation of mining wastes and contaminated soils at portions of the site. The contractor shall be required to comply with all applicable federal, state, and local laws and regulations. Remediation will be conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERECLA) as amended by the Superfund Amendments and Reauthorization Action (SARA), and National Contingency Plan (NCP) requirements. EPA anticipates issuing an Indefinite Delivery / Indefinite Quantity (IDIQ) with fixed-unit prices contract consisting of a one-year base period and four one-year option periods. https://sam.gov/opp/d6a140d8f576df45825dcfc9bbb74b5c/view

Cleanup News

75 MILLION GALLONS LATER – 5 YEAR UPDATE ON WORLD'S FIRST REGENERABLE RESIN SYSTEM TREATING PFAS
McKeown, P., E. Houtz, and N. Bolea. I AEHS Foundation 32nd Annual International Conference on Soil, Water, Energy and Air, 20-23 March, San Diego, CA, 22 slides, 2023

Side-by-side pilot tests were conducted in 2016, followed by designing and installing a PFAS Treatment plant utilizing SORBIX RePURE Regenerable Ion Exchange Resin as part of ongoing response activities to remove PFAS-impacted groundwater at the former Pease Air Force Base in New Hampshire. The 200-gpm capable system was designed to meet the primary project objective of producing treated water with combined PFOS+PFOA concentrations below the 70 ng/l Health Advisory Level. In the five years since commissioning, the PFAS remediation system has treated >75 million gals of groundwater, with a total average influent PFAS concentration of 60 µg/l. The effluent quality from the IX resin system was consistently non-detect for PFOS and PFOA, readily achieving compliance with the 70 ng/l target. Twenty-four successful resin regenerations have been performed to date, with no decrease in sorptive capacity. Operational modifications were conducted to address and correct minor challenges with the distillation system, and regenerant recovery and super-loading processes have proven successful. The original SuperLoading media is still operational, having removed and concentrated >99.99% of the recovered PFAS mass, and no PFAS waste has been hauled offsite to date. The system operates at concentration factors of >1 million to one, meaning less than a gallon of waste is generated for every million gallons of 60 ug/l PFAS-impacted water treated.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-EA2E-2B6D-01D92AC0E42DCE3B_abstract_File22921/PDFforhandouttoattendeesopt_174_0318110345.pdf

MULTI-PRONGED APPROACH TO REMEDIATE AND MITIGATE CHLORINATED SOLVENT IMPACTS
Mcgruire ,A., W. Kwan, and M. Escobar. I AEHS Foundation 32nd Annual International Conference on Soil, Water, Energy and Air, 20-23 March, San Diego, CA, 40 slides, 2023

A multi-pronged approach to remediate VOC contamination, primarily PCE and TCE, in shallow soil, soil vapor, and groundwater was implemented at a former printing press within the Orange County South Basin. The site was impacted by onsite releases and a regional VOC plume that affects shallow and intermediate aquifers in the South Basin. The strategy aimed to remediate onsite impacts, prevent further offsite migration in shallow groundwater, and mitigate potential vapor intrusion from the regional plume. In situ chemical reduction (ISCR) injections of micro-scale, colloidal, sulfidated zero-valent iron (S-MicroZVI) mixed with water were implemented to address source area impacts in shallow groundwater. The program consisted of 24,740 gals of ISCR amendment solution injected across 38 points at depths between 7 and 18 ft bgs, covering an area of ~5,000 square feet. An SVE system was also installed beneath the same area to address source area impacts in soil and soil vapor. ISCR injections consisting of S-MicroZVI and PlumeStop® mixed with water were conducted to create a permeable reactive barrier (PRB) to mitigate offsite VOC migration in shallow groundwater. The program consisted of 29,480 gals of ISCR amendment solution injected across 67 points at depths between 8 and 18 feet bgs, across ~200 linear feet. A subslab depressurization system capable of operating in active or passive modes was installed to mitigate future potential vapor intrusion from the regional plume. Performance data indicate groundwater concentrations of PCE and TCE in the source area were reduced by an average of 99% and 94%, respectively, and by an average of 99% for PCE and TCE in subslab soil vapor. https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-EA2E-2B6D-01D92AC0E42DCE3B_abstract_File22921/PDFforhandouttoattendeesopt_157_0316083732.pdf

ENDOPHYTE-ASSISTED PHYTOREMEDIATION SYSTEMS FOR SOIL AND GROUNDWATER REMEDIATION
OToole, G., J. Freeman, C. Cohu, D. Rowe, and E. Pearson. I AEHS Foundation 32nd Annual International Conference on Soil, Water, Energy and Air, 20-23 March, San Diego, CA, 32 slides, 2023

The presentation covers data from full-scale phytoremediation projects currently deployed and lessons learned from utilizing Endophyte-Assisted Phytoremediation System (EAPS) technology. These synergistic bioremediation tools and innovative techniques have been deployed to address several classes of pollutants, including chlorinated VOCs, petroleum hydrocarbons, and 1,4-dioxane alone and in mixed wastes. Data is shared from several active remediation installations where grass, tree and plant species have been inoculated with endophytes identified and characterized by Dr. Sharon Doty. Data and lessons learned are highlighted from contaminated sites in Southern California where EAPS is installed to treat chlorinated solvents (PCE, TCE, DCE) and 1,4-dioxane in groundwater. Endophytic bacteria, isolated and cultured by Dr. Doty, were introduced with hybrid poplar trees to address TCE groundwater contamination at the MEW Superfund site. During the past seven years, the first pilot on the MEW site was expanded to a full-scale solution. Currently, endophyte-assisted phytoremediation is deployed at more than 30 Superfund, state-mandated cleanup, and redevelopment sites across the U.S. The presentation looks to future deployments using additional tree bacterial endophyte strains already selected and identified for addressing PCBs, TNT, and RDX. Applying EAPS further confirmed that endophytes contribute to phytoremediation success and improved plant establishment, in-planta degradation, and enhanced source-zone depletion rates. Data suggests that endophytes are the key factor in plant establishment at sites with phytotoxic concentrations of petroleum hydrocarbons or chlorinated solvents. EAPS represents a standalone treatment for mitigating contaminant migration and in situ degradation of soil and groundwater contaminants.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-EA2E-2B6D-01D92AC0E42DCE3B_abstract_File22921/PDFforhandouttoattendeesopt_168_0331112211.pdf

Demonstrations / Feasibility Studies

ARSENIC IMMOBILISATION IN SOIL USING ELECTRICITY-INDUCED SPREADING OF IRON IN SITU
Kumpiene, J., K. Engstrom, A. Pinedo Taquia, I. Carabante, and J. Bjuhr.
Journal of Environmental Management 325(Part A):116467(2023)

A study tested the distribution of Fe from corroding electrodes through soil using a low-voltage direct current to immobilize As in contaminated soil in a lab setting and validated the method in the field. Lab tests revealed that the corrosion of Fe electrodes in soil occurred in a way similar to that during the Fe electrocoagulation in water, which decreased the As concentrations in flow-through water from 150 µg/L to undetectable levels. Method validation over one year in the field using electric current pulses with reversing polarity revealed a decrease in As concentration in groundwater by 72-97% in five of the six groundwater wells within the experimental area. This in situ method of introducing Fe amendments to soil can reduce the need for soil excavation upon chemical immobilization of contaminants in soil.

THE EVOLUTION OF TWO REMEDIATION METHODS: COMBINED IN SITU STABILIZATION (ISS) AND IN SITU CHEMICAL OXIDATION (ISCO)
Telesz, S., J. Molin, and B. Smith. I AEHS Foundation 32nd Annual International Conference on Soil, Water, Energy and Air, 20-23 March, San Diego, CA, 26 slides, 2023

In situ chemical oxidation (ISCO) and in situ stabilization (ISS) were evaluated in a series of bench and pilot-scale tests that analyzed varying dose combinations of sodium persulfate with different binders based on their effect on soil stability, hydraulic conductivity and leaching. The presentation provides a history of the technologies' development, reviews scientific theory and discusses the limitations of each technology. Data from bench-scale experiments and field applications illustrate how concentration and stabilization goals can be achieved in a combined application. Data shows that adding sodium persulfate can make an ISS application more efficient by reducing the total amount of additives (binder + oxidizing agent). This reduces the soil mass that is displaced and the need for further handling and disposal of excess soil masses. A combined ISCO/ISS strategy can result in significant cost and energy savings. Adding sodium persulfate also resulted in lower hydraulic conductivity and higher strength compared to soils treated with cement only at a similar dose of cement. Field trial data illustrates a reduction in the concentration of more mobile substances such as benzene, naphthalene, and other lighter petroleum products to below the soil action targets, while remaining heavier hydrocarbons were bound with the addition of binders and achieved the targets for reduced leachability. https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-EA2E-2B6D-01D92AC0E42DCE3B_abstract_File22921/PDFforhandouttoattendeesopt_177_0317035304.pdf

MICROBIAL COMMUNITY RESPONSE TO A BIOAUGMENTATION TEST TO DEGRADE TRICHLOROETHYLENE IN A FRACTURED ROCK AQUIFER, TRENTON, N.J
Underwood, J.C., D.M. Akob, M. Mi Lorah, T.E. Imbrigiotta, R.W. Harvey, and C.R. Tiedeman
Microbial Ecology 98(7): fiac077(2022)

The response of groundwater microbial populations was evaluated in a bioaugmentation test where an emulsified vegetable oil solution (EOS®) and a dechlorinating consortium (KB-1®), containing *Dehalococcoides* (DHC), were injected into a TCE-contaminated fractured rock aquifer. Indigenous microbial communities responded within two days to the added substrate and outcompeted KB-1®. Over seven years, several other notable turnover events were observed. Concentrations of ethene had the strongest correlations (P<0.05) with members of Candidatus *Colwellbacteria,* but their involvement in reductive dechlorination is unknown and warrants further investigation. DHC never exceeded 0.6% relative abundance of groundwater microbial communities, despite its previously presumed importance. Increased concentrations of carbon dioxide, acetic acid, and methane were positively correlated with increasing ethene concentrations. Concentrations of cis-DCE and VC remained high at the end of the monitoring period, suggesting preferential enrichment of indigenous partial dechlorinators over bioaugmented complete dechlorinators. *This article is* ***Open Access*** *at* https://academic.oup.com/femsec/article/98/7/fiac077/6617581

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 the transition zone, with the highest PCE concentrations in the interface with the bottom aquitard. The pilot study tested a combined strategy using ZVI in microparticles and biostimulation with lactate in the form of lactic acid. The interdependence of the coupled biotic and abiotic processes generated synergies between these processes, resulting in greater degradation of the PCE and its transformation products. Combining the two techniques effectively mobilized the contaminant source.
https://reader.elsevier.com/reader/sd/pii/S0048969723013670?token=B200A5E53EA5FB2E5862E47ECE75BDA989B51AD0B7E5DB9A6E508BDCB67E7C659D6F601727C188E63B11C6EE9A505156&originRegion=us-east-1&originCreation=20230412

Research

AN EVALUATION OF THE EFFICACY OF REMEDIAL ACTIONS IMPLEMENTED IN THE COMMENCEMENT BAY NEARSHORE AND TIDEFLATS SUPERFUND SITE TO REDUCE PCB CONTAMINATION: 1984-2019
Washington Department of Fish and Wildlife, Report Number FPT 22-04, 34 pp, 2022

The Washington Department of Fish and Wildlife (WDFW) conducted a study at the Commencement Bay Nearshore and Tideflats (CB/NT) Superfund site to evaluate whether PCBs in English sole (*Parophrys vetulus*) have declined sufficiently since 1984 to achieve EPA's target tissue cleanup objective for human health. PCBs in English sole sampled from 15 locations in Operable Unit 1 of the CB/NT Superfund site were compared with English sole from Carr Inlet Reference Area (CIRA), a nearby reference location in the southern Puget Sound basin containing no known or suspected local PCB sources. Total PCBs measured using the Aroclor and paired PCB-congener analysis methods showed largely congruent results. Although the overall CB/NT recovery goal was met, substantial areas of contamination in the CB/NT remained. English sole from the Hylebos and Thea Foss waterways exhibited significantly greater PCB tissue concentrations than the CIRA at concentrations among the highest PCB levels measured in English sole from the Puget Sound. Long-term Toxics Biological Observation System (TBiOS) monitoring of PCB levels in English sole from the Thea Foss Waterway has shown no evidence of a declining PCB trend over the past 30 years. Comparing WDFW's 13 TBiOS English sole monitoring stations throughout Puget Sound, English sole from the CIRA were statistically indistinguishable from two TBiOS stations that could represent background PCB conditions in the primary basins of Puget Sound. The average TPCB concentration in English sole from three background locations (12.8 ng/g wet weight) was slightly higher than the PCB recovery target (8 ng/g wet weight) adopted by the Puget Sound Partnership Vital Signs for Puget Sound Recovery. This disparity highlights Washington State's aim to reduce PCBs throughout Puget Sound to a level lower than its current background to protect subsistence consumers. https://wdfw.wa.gov/publications/02335

RESEARCH BRIEF 339: NEW MODEL ESTIMATES PFAS EXPOSURES FROM CONTAMINATED DRINKING WATER
National Institute of Environmental Health Sciences, Superfund Research Program (SRP) Research, March 2023

A new study funded by the NIEHS Superfund Research Program (SRP) developed a model to estimate individual exposure to four PFAS commonly found in drinking water. The model integrates published data from multiple studies on PFAS levels in human blood and measured PFAS concentrations in drinking water. Tools for estimating PFAS exposure from contaminated drinking water can inform public health risk assessments and advisories. According to the team, the analysis is the largest to date of its kind, which included researchers from the Texas A&M University SRP Center, Abt Associates, and the Agency for Toxic Substances and Disease Registry, part of the Centers for Disease Control and Prevention. The team's research forms the basis of a new web-based tool maintained by ATSDR to help the public estimate personal exposures to PFAS in tap water. https://tools.niehs.nih.gov/srp/1/ResearchBriefs/pdfs/SRP_ResearchBrief_339_508.pdf

PASSIVE WATER SAMPLING AND AIR-WATER DIFFUSIVE EXCHANGE OF LONG-RANGE TRANSPORTED SEMI-VOLATILE ORGANIC POLLUTANTS IN HIGH-MOUNTAIN LAKES
Prats, R.M., BL. van Drooge, P. Fernandez, and J.O. Grimalt.
Science of The Total Environment 860:160509(2023)

Using passive water samplers, concentrations of legacy and currently emitted organic contaminants were measured in the freely dissolved water phase from six high-mountain lakes in the Pyrenees (1,619-2,453 m). Low-density polyethylene (LDPE) and silicone rubber (SR) sheets were exposed for 3 consecutive years between 2017 and 2020 to study PCBs, organophosphate esters (OPEs), PAHs, and hexachlorobenzene (HCB). HCB concentrations (1.0-14 pg/L) were similar to those measured with pumping systems over 2 decades ago in the same area. ΣPAHs (35-920 pg/L) were ~half of those observed in the past, agreeing with reductions in European atmospheric emissions. ΣPCB concentrations (1.2-2.2 pg/L) were substantially lower; unexpectedly large differences could be due to comparing yearly averages from the present study to seasonally variable episodic pumping measurements from previous studies. ΣOPEs (139-2,849 pg/L), measured for the first time in this area, were found at high concentrations at some sites. Most concentrations obtained with LDPE and SR samplers agreed by ratios generally lower than three or four times, except for a few PAHs and OPEs. Diffusive exchange flux calculations between the atmospheric gas and freely dissolved water phases revealed net deposition of pollutants from air to water, except for some OPEs and PCBs presenting equilibrium conditions and HCB with volatilization fluxes. Atmospheric degradation fluxes of PAHs and OPEs suggested competing removal mechanisms that support the air-to-water direction of their diffusive exchange, while PCBs and organochlorines were not affected by photodegradation.

COMPARING EQUILIBRIUM CONCENTRATIONS OF POLYCHLORINATED BIPHENYLS BASED ON PASSIVE SAMPLING AND BIOACCUMULATION IN WATER COLUMN DEPLOYMENTS
Burgess, R.M., M.G. Cantwell, Z. Dong, J.S. Grundy, and A.S. Joyce.
Environmental Toxicology and Chemistry 42(2):317-332(2023)

A study compared the bioaccumulation of selected PCBs by mussels in water column deployments at the New Bedford Harbor Superfund site to codeployed passive samplers over three years. Based on comparisons to the calculated passive sampler equilibrium concentrations, mussels were not at equilibrium, and the subsequent analysis focused on evaluating approaches to estimate equilibrium bioaccumulation. A limited evaluation of metal bioaccumulation by the exposed mussels and a metal passive sampler was performed. Generally, mussel and passive sampler PCBs accumulation were significantly correlated. Agreement on the magnitude of accumulation was optimal when bioaccumulation and passive sampler uptake were not corrected for non-equilibrium conditions. A comparison of four approaches for estimating equilibrium mussel bioaccumulation (octanol-water partition coefficients [K_{OW}], triolein-water partition coefficients [K_{TW}], and two types of polymer-lipid partition coefficients) demonstrated that field-deployed mussels were not at equilibrium with many PCBs. A range of estimated equilibrium mussel bioaccumulation concentrations was calculated, with the magnitude of the K_{OW}-based values being the smallest and the polymer-lipid partition coefficient-based values being the largest.

REMEDIATION CHARACTERISTICS OF SURFACTANT-ENHANCED AIR SPARGING (SEAS) TECHNOLOGY ON VOLATILE ORGANIC COMPOUNDS CONTAMINATED SOIL WITH LOW PERMEABILITY
Xu L., L. Yan, F. Zha, F. Zhu, X. Tan, B. Kang, C. Yang, and Z. Lin.
Journal of Contaminant Hydrology 250:104049(2022)

The feasibility and remediation characteristics of surfactant-enhanced air sparging (SEAS) on low-permeability, VOC-contaminated soil were explored by designing a series of 2-D physical model tests. Incorporating and increasing surfactant concentration promoted air channel formation in the low-permeability soil, reducing the capillary breakthrough pressure and improving the airflow rate. Most exhausted gaseous contaminants were distributed horizontally, differing from results observed in medium and high-permeability soils. The exhausted gaseous contaminant concentration changed slightly when the sparging pressure and surfactant concentration increased at relatively low levels and increased as the sparging pressure and surfactant concentration increased. Increasing the air sparging pressure without surfactant incorporation or with a low surfactant concentration did not effectively remove the contaminant; further increases in surfactant concentration can enhance removal efficiency. Discrete remediation characteristics were confirmed during SEAS application on low-permeability soil. Relationships between the ratios of remediation area and remediation extent under different surfactant concentrations and sparging pressures were established to evaluate remediation efficiency. This method can recreate the discrete remediation characteristics once the surfactant concentration and the sparging pressure are chosen. Controlling the surfactant concentration and sparging pressure can achieve targeted improvements in the remediation area.

COUPLING MICROSCALE ZERO-VALENT IRON AND AUTOTROPHIC HYDROGEN-BACTERIA PROVIDES A SUSTAINABLE REMEDIATION SOLUTION FOR TRICHLOROETHYLENE-CONTAMINATED GROUNDWATER: MECHANISMS, REGULATION, AND ENGINEERING IMPLICATIONS
Yuan, M., J. Xin, X. Wang, F. Zhao, L. Wang, and M. Liu.
Water Research 216:118286(2022)

A study systematically compared the performances of microscale zero-valent iron (mZVI), H_2- autotrophic hydrogen bacteria (AHB), and mZVI-AHB to remove TCE. The study also optimized the dechlorination and H2 evolution of mZVI-AHB synchronously by regulating the mZVI particle size and dosage to achieve a remediation solution. The final removal efficiency and removal rate of TCE by mZVI-AHB were 1.67-fold and 5.30-fold of those by mZVI alone respectively; mZVI-AHB resulted in more complete dechlorination than H2-AHB alone. Combining H2 evolution kinetics, material characterization data, and bacterial community analysis results point to the following mechanisms responsible for the improved dechlorination performance of mZVI-AHB: H_2 generated by mZVI corrosion was efficiently utilized by AHB, lasting corrosion of mZVI was facilitated by AHB, and dechlorination functional bacteria were highly enriched by mZVI. Remediation performance of mZVI-AHB with different mZVI particle sizes and dosages was evaluated comprehensively in terms of dechlorination reactivity, H_2 utilization efficiency and chemical cost.

General News

EPA'S PFAS STRATEGIC ROADMAP: A YEAR OF PROGRESS
U.S. EPA, EPA-800-K-22-001, 12 pp, 2022

EPA released its PFAS Strategic Roadmap, highlighting concrete actions the Agency will take across various environmental media and EPA program offices to protect people and the environment from PFAS contamination.

- Research. Investing in research, development, and innovation to increase the understanding of PFAS exposures and toxicities, human health and ecological effects, and effective interventions that incorporate the best-available science.
- Restrict. Pursuing a comprehensive approach to proactively prevent PFAS from entering air, land, and water at levels that can adversely impact human health and the environment.
- Remediate. Broadening and accelerating the cleanup of PFAS contamination to protect human health and ecological systems.

This progress report summarizes the critical actions the Agency has taken over the past year to advance progress toward these goals. In addition, this document highlights milestones EPA will achieve in the near future. Since the Roadmap's release in October 2021, EPA has taken several key actions:

- Proposed to designate two PFAS as CERCLA hazardous substances. If finalized, this will be a critical step toward increasing transparency around releases of PFAS and holding polluters accountable for cleaning up their contamination.
- Released drinking water health advisories. Acting in accordance with EPA's mission to protect public health and keep communities and public health authorities informed when new science becomes available, the Agency issued drinking water health advisories for four PFAS.
- Laid the foundation for enhancing data on PFAS including an order under EPA's National PFAS Testing Strategy requiring companies to conduct PFAS testing, and nationwide sampling for 29 PFAS in drinking water starting in 2023.
- Began distributing $10 billion in funding to address emerging contaminants under the Bipartisan Infrastructure Law. EPA is making transformational investments to clean up PFAS and other emerging contaminants in water, especially in small or disadvantaged communities.

https://www.epa.gov/system/files/documents/2022-11/PFAS%20Roadmap%20Progress%20Report_final_Nov%2017.pdf

ENVIRONMENTALLY SUSTAINABLE METHODS TO REMOVE AFFF FROM FIREFIGHTING DELIVERY SYSTEMS
Bellona, C. | SERDP & ESTCP Webinar Series, March 2023

This SERDP and ESTCP webinar focuses on DoD-funded research efforts to develop approaches for remediating AFFF-impacted fire suppression systems. Investigators cover a rinsing procedure to remove PFAS from AFFF delivery equipment, evaluation of a closed-circuit high-pressure nanofiltration/reverse osmosis system for the concentration and treatment of AFFF residuals, and lab and field demonstrations to remove PFAS entrained on surfaces.
https://serdp-estcp.org/webinars/details/8e620751-8b5d-4f2a-9868-e197123e9ffb/environmentally-sustainable-methods-to-remove-afff-from-firefighting-delivery-systems

ACTIVATION OF PERSULFATE FOR GROUNDWATER REMEDIATION: FROM BENCH STUDIES TO APPLICATION
Li, Y., G. Liu, J. He, and H. Zhong. | Applied Sciences 13(3):1304(2023)

This review summarizes current research on the applications of activated persulfate for remediation and extracts the knowledge necessary to form applicable technologies. The review describes the remediation efficiency and mechanism of activated persulfates by heat, alkaline, metal-based, and electrokinetic-activated technologies; presents the major factors, including pH, the persistence of persulfate, and the radius of influence and soil property during in situ chemical oxidation (ISCO) remediation; and discusses the rebound process and impact towards microbial communities following ISCO application. *This article is* ***Open Access*** *at* https://www.mdpi.com/2076-3417/13/3/1304

PHYTOREMEDIATION: MECHANISMS, PLANT SELECTION AND ENHANCEMENT BY NATURAL AND SYNTHETIC AGENTS
Kafle, A., A. Timilsina, A. Gautam, K. Adhikari, A. Bhattarai, and N. Aryal.
Environmental Advances 8:100203(2022)

This article summarizes existing information and recent findings on plant species suitable for use in phytoremediation through utilizing different mechanisms, aids that can enhance the efficiency of phytoremediation processes, and strengths and limitations of this application. Diverse plants remediate different pollutants at different rates through one or multiple mechanisms. The limitations of phytoremediation can be overcome by using several aids including natural and chemical amendments, genetic engineering, and natural microbial stimulation. Phytoremediation can be a reliable solution for sustainable and economical remediation of soil and water from organic and inorganic pollutants.

OPTIMIZATION AND ADVANCES IN AMENDMENTS FOR CHLORINATED SOLVENT SITES
Birk, G., D. Alden, and J. Sankey. | AEHS Foundation 32nd Annual International Conference on Soil, Water, Energy and Air, 20-23 March, San Diego, CA, 32 slides, 2023

This presentation reviews options for in situ production and distribution of the correct type of fatty acids essential for effective reductive dechlorination to expedite closure. Options for overcoming challenges associated with acidic aquifers, cDCE and VC stalling, biofouling, and formation of saponified materials in the injections are presented. A review of advances in minimizing surfactants for preparation of oil-in-water emulsions and recent developments in preparing surfactant-free oil-in-water emulsion is also provided.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-EA2E-2B6D-01D92AC0FE2DCE3B_abstract_File22921/PDFforhandouttoattendeesont_199_0315032950.pdf

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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