Technology Innovation News Survey

Entries for October 1-15, 2022

Market/Commercialization Information

STRATEGIC ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM (SERDP) CORE BROAD AGENCY ANNOUNCEMENT (PRESOL)
U.S. Army Corps of Engineers, Humphreys Engineer Center Support Activity, Alexandria, VA
Contract Opportunities on SAM.gov, Solicitation W912HQ23S0001, 2022

When the solicitation is released, it will be competed as a full and open competition under NAICS code 541715. The Department of Defense (DoD) Strategic Environmental Research and Development Program (SERDP) is interested in receiving pre-proposals for research focusing on the areas of Environmental Restoration, Munitions Response, Resource Conservation and Resiliency, and Weapons Systems and Platforms. 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 Statements of Need 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 problems. There is no commitment by SERDP to make any contract awards, nor to be responsible for any costs incurred by the offeror before contract award is made. It is anticipated that multiple awards totaling approximately $10 million will be made available for projects dependent upon the quality of proposals received and availability of funds. Pre-proposals are due by 2:00 PM EST on January 10, 2023.https://sam.gov/opp/272de5cfd8ea45a593704552aefaa78d/view

STRATEGIC ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM (SERDP) EXPLORATORY DEVELOPMENT (SEED) BROAD AGENCY ANNOUNCEMENT (PRESOL)
U.S. Army Corps of Engineers, Humphreys Engineer Center Support Activity, Alexandria, VA
Contract Opportunities on SAM.gov, Solicitation W912HQ23S0002, 2022

When the solicitation is released, it will be competed as a full and open competition under NAICS code 541715. The Department of Defense (DoD) Strategic Environmental Research and Development Program (SERDP) is interested in receiving proposals for innovative research as set forth in the Announcement of the SERDP Exploratory Development (SEED) program. 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 SERDP's intent to competitively fund research and development projects to establish proof of concept for innovative environmental technologies and methods under the following Program Areas: Environmental Restoration, Munitions Response, Resource Conservation and Resiliency, and Weapons Systems and Platforms. These projects will be funded with firm-fixed-price contracts at a level not to exceed the Simplified Acquisition Threshold of $250,000 in total costs; projects should be no more than approximately one year in duration. Both small businesses and other than small businesses (including academia and non-profits) are encouraged to respond. Proposals are due by 2:00 PM EST on March 14, 2023. https://sam.gov/opp/1c9b2d2a9f5f4d50a879f20858c59fe8/view

REGION 5 ENVIRONMENTAL SITE INVESTIGATION & CLEANUP IDIQ (PRESOL)
U.S. Department of Agriculture Forest Service, Washington, DC
Contract Opportunities on SAM.gov, Solicitation 1297023R0002, 2022

When the solicitation is released, it will be competed as a full and open competition under NAICS code 562910. The U.S. Department of Agriculture Forest Service seeks industry feedback, comments, and questions on the Request for Proposals (RFP) for its Region 5 Environmental Site Investigation and Cleanup IDIQ. The United States Forest Service (USFS) requires professional environmental services for responding to and cleaning up releases of hazardous substances and wastes on National Forest System (NFS) lands in Region 5 (California). Work will include: non-CERCLA site investigation, cleanup, and restoration including, but not limited to asbestos and lead-based paint assessment and abatement, indoor air quality and mold, and underground storage tanks; post-natural disaster hazardous material site cleanup and removal from Forest Service and privately owned sites on NFS lands; and investigations and/or cleanup of hazardous materials/wastes and associated contamination at illegal marijuana grow sites. Interested parties are invited to review the DRAFT RFP and attachments and submit feedback, comments, and questions during a Pre-Solicitation MS Teams conference call that will be hosted by USFS on Tuesday, November 22, 2022, at 11:00 AM PT. Written feedback and questions can also be submitted by email no later than Friday, November 25, 2022https://sam.gov/opp/bd70c9a99fbd4c55b3724f9a60438bb6/view

DEVELOPING AND DEMONSTRATING NANOSENSOR TECHNOLOGY TO DETECT, MONITOR, AND DEGRADE POLLUTANTS
Environmental Protection Agency, Funding Opportunity EPA-G2023-STAR-A1, 2022

EPA is seeking projects with expected results that can be practically applied in real-world settings and potentially transform environmental monitoring and management, not proof-of-concept or bench-scale projects. While this RFA solicits original nanotechnology projects, applicants should not propose a new prototype but rather a system that can be demonstrated to detect and degrade contaminants in the relevant environment. This RFA solicits applications that address both of the following research areas. Applications that only address one research area may not be rated as highly as those that address both.

- **Research Area 1:** Develop and demonstrate nanosensor technology to detect and monitor pollutants.
- **Research Area 2:** Develop and demonstrate nanosensor technology with functionalized catalysts to degrade selected contaminants

It is anticipated that a total of ~$1.5 million will be awarded under this announcement, depending on the availability of funds, quality of applications received, and other applicable considerations. The EPA anticipates funding approximately 1 award under this RFA. Requests for amounts in excess of a total of $1,500,000 per award, including direct and indirect costs, will not be considered. The total project period requested in an application submitted for this RFA may not exceed three years. Applications must be received by 11:59 pm ET on December 7, 2022. https://www.grants.gov/web/grants/view-opportunity.html?oppId=344112

Cleanup News

A TWENTY-FIVE-YEAR EXAMINATION OF ZEROVALENT IRON FOR GROUNDWATER REMEDIATION: THE ELIZABETH CITY, NC, CASE STUDY
Wilkin, R., T. Lee, M. Sexton, S. Acree, R. Puls, D. Blowes, C. Kalinowski, J. Tilton, and L. Woods. I Twelfth International Conference on the Remediation of Chlorinated and Recalcitrant Compounds, 22-26 May Palm Springs, CA, 19 slides, 2022

The U.S. Coast Guard Support Center site in Elizabeth City, North Carolina, provides the longest available performance record for a permeable reactive barrier (PRB) utilizing zerovalent iron (ZVI) to treat chlorinated solvents and hexavalent chromium in groundwater. For several decades, utilization of in situ groundwater treatment technologies, such as PRBs, has grown, with a related overall decrease in the selection of aboveground pump-and-treat remedies. These trends reflect acceptance and reliance on the innovative remediation approaches for site cleanup developed and implemented during the 1980s and 1990s. The PRB technology is commonly considered a potential remedy at contaminated sites, and the largest uncertainty about its use is typically related to accurately predicting longevity. Long-term datasets on remedial performance help constrain potential effectiveness; however, these data need to be relatable to site conditions. The current state-of-the-art for in situ groundwater remediation requires combining knowledge about site geochemistry and hydrology with a mechanistic understanding of specific technologies to best match sites with technologies to improve outcomes.
https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=354894&Lab=CESER&simplesearch=0&showcriteria=2&sortby=pubDate&timstype=&datebeginpublishedpresented=06/15/2019&searchall=cleanup

CASE STUDIES OF EXPERT-INFORMED COMPUTATIONAL OPTIMIZATION FOR GROUNDWATER RESTORATION OF LARGE, DIFFUSE, MULTIPLE COC PLUMES AT TWO PROJECT SITES
Deschaine, L.M. I DCHWS Design and Construction Spring 2022 Symposium, 30 March-1 April, Philadelphia, PA, 25 slides, 2022

The Physics-Based Management Optimization (PBMO™) system links environmental modeling with management optimization focused on finding the best value solution to a challenge. The PBMO tool identifies optimal remedial design and operational approaches that lead to timely and cost-effective cleanups. By linking modeling and computational optimization, PBMO can realistically capture important site physics and financial constraints; achieve a coherent interpretation of disparate site data using all relevant information; and produce structured, credible solutions acceptable to stakeholders and regulators. The presentation covers PBMO application at the DoE Pantex Plant and a DoD NPL site in Nebraska. PBMO was used to perform optimal analysis on the existing pump & treat (P&T) system over a 20-year period at the Pantex Plant site. An additional 10 years of simulation time were included in certain scenarios to assess the benefit in terms of meeting remedial action objectives of a one-time amendment injection to enhance in situ treatment following the active P&T system. PBMO was used to optimize individual well pumping rates to maximize RDX removal; Cr(VI) and perchlorate responses were then evaluated, and select extraction well rates were adjusted to improve system performance. At the Nebraska site, PBMP was used to design a new groundwater remediation system. https://drive.google.com/file/d/15Yib-jVcN19vHCnGN1RzS6QvH0_7rMYm/view
More information about PMBO: https://www.youtube.com/embed/QeZ_QLwkRm4
Pantex Plant optimization report: https://www.osti.gov/servlets/purl/1834053
More information on using PBMO at the Nebraska site: https://www.youtube.com/watch?v=0DTqJBo18g4

COMBINED REMEDY TREATMENT OF MULTI-CHEMICAL SOLVENT PLUME IN FINE-GRAINED LOW-PERMEABILITY SEDIMENTS
Brab, B. I DCHWS Design and Construction Spring 2022 Symposium, 30 March-1 April, Philadelphia, PA, 17 slides, 2022

A combination of ex-situ and in-situ remediation methods was selected to achieve site cleanup goals at a former chemical plant. Subsurface investigations indicated the presence of CVOCs, with PCE being the most widespread. The primary objective was to design a multi-year affordable, effective remedy that considered longevity and efficiency to maximize available funding and installation opportunities. The initial plan to mitigate risk at the facility was to limit offsite plume migration. A total of 44 remedial design characterization (RDC) soil borings were advanced at the site; 880 soil and 95 groundwater samples were submitted for lab analysis. Based on the RDC results, the remedy was conducted in four phases:

- Phase 1: 22,050 lbs of BOS 100® was applied into 233 injection locations from 20 to 40 ft bgs.
- Phase 2: 6,700 lbs of sodium persulfate (lime activation) was blended into the shallow soils from grade to 4 ft bgs.
- Phase 3: 9,000 lbs of CAT 100 was applied into 73 injection locations from 20 to 40 ft bgs.
- Phase 4: 10,000 lbs of CAT 100 was applied into 71 injection locations from 20 to 40 ft bgs.

Indiscriminate high-density sampling for quantitative analysis allowed for efficient treatment during remediation with predictable expectations. Investigations also supported the conceptual site model that indicated the contaminant plume was geologically controlled by low-permeability clays. CVOC concentrations in a downgradient monitoring well were reduced by 95%. Immediately following injection, PCE concentrations decreased, and reductions were maintained, indicating that the BOS 100® is managing the contaminant back diffusion from the soil matrix. Ethylene and ethane remain elevated and support that abiotic contaminant reduction is occurring. Based on the success of mitigating DNAPL impacts at sites, CAT 100 has been selected as the primary remedial strategy to further reduce remaining source impacts. https://drive.google.com/file/d/1moc6g9AnnZefK6PIq4BVCFdoZES_mnfu/view

Demonstrations / Feasibility Studies

PILOTING ACTIVITIES FOR THE DESIGN OF A LARGE-SCALE BIOBARRIER INVOLVING IN SITU SEQUENTIAL ANAEROBIC-AEROBIC BIOREMEDIATION OF ORGANOCHLORIDES AND HYDROCARBONS
Casiraghi, G., D. Pedretti, G.P. Beretta, M. Bertolini, G. Bozzetto, L. Cavalca, L. Ferrari, M. Masetti, and J. Terrenghi. I Water, Air, & Soil Pollution 233:425(2022)

Multiscale characterization activities were conducted that were propaedeutic to the construction of Italy's largest (> 400 m long) sequential in situ bioremediation (ISB) system to remediate a solute plume containing petroleum hydrocarbons (PHCs) and chlorinated aliphatic hydrocarbons (CAHs) in an alluvial aquifer. Microcosm experiments determined the biodegradation potential under anaerobic and aerobic conditions. In situ tests were performed by installing two 40-m-long pilot biobarriers for sequential anaerobic and aerobic degradation intercepting part of the contamination plume. Results indicated the need to add biostimulating compounds to accelerate biodegradation under aerobic and anaerobic conditions. In situ tests showed removal efficiencies of up to 95 and 99% for total CAHs and PHCs, respectively, proving the feasibility of the full-scale ISB system. Apparent discrepancies between lab and in situ tests can be ascribed to scale effects and aquifer heterogeneities. https://link.springer.com/content/pdf/10.1007/s11270-022-05886-1.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.M. Lorah, T.E. Imbrigiotta, R.W. Harvey, and C.R Tiedeman.
FEMS Microbiology Ecology 98(7):fiac077(2022)

A seven-year study examined the response of groundwater microbial populations 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 added substrate and outcompeted KB-1®. Several other notable turnover events were observed during the seven-year study. Concentrations of ethene had the strongest correlations (P< .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 carbon dioxide, acetic acid, and methane concentrations were positively correlated with increasing ethene concentrations. However, 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.

USE OF DUAL-MEMBRANE PASSIVE DIFFUSION BAGS TO SAMPLE PFAS
Evans, J. and D. Eberle. I 2021 Great Lakes Virtual PFAS Summit, 6-10 December, virtual, 40 minutes, 2021

A study was conducted at a field site in New Jersey to compare traditional low-flow purge and sample methodology with dual-membrane passive diffusion bags (DMPDBs). A subset of monitoring wells was tested for 26 PFAS compounds, including PFOA, PFNA, and PFOS. Low-flow sampling was conducted using a Geotech bladder pump with low-density polyethylene bladders and high-density polyethylene tubing. Results were comparable with at least 73% of the PFAS data at each well having < 25% relative percent difference between DMPDB and low-flow techniques. In general, the DMPDB results were slightly higher. The DMPDBs were easier and less expensive to use than the low-flow technique and required less field time.
https://us06web.zoom.us/rec/play/NoM3v3pzyOJbUAEi-9V7Z6CAfwLG8Rxhwh6zWwQHSM7d_qRTOJW14u9kxYLJsdKILFLhEqg3vJ82_fry.fErUlWUcemBJcVt5?continueMode=true&_x_zm_rtaid=6QGWBhjNQs6lXbotZdeyrQ.1667239310269.d17643a066

ASSESSMENT OF PFAS IN COLLOCATED SOIL AND POREWATER SAMPLES AT AN AFFF-IMPACTED SOURCE ZONE: FIELD-SCALE VALIDATION OF SUCTION LYSIMETERS
Anderson, R.H., J.B. Field, H. Dieffenbach-Carle, O. Elsharnouby, and R.K. Krebs.
Chemosphere 308(Part 1):136247(2022)

PFAS occurrence was evaluated in lysimeter-collected porewater samples for two depth intervals at a decades-old aqueous film-forming foam (AFFF)-impacted field site quarterly for a year. Site-wide Log_{10} (ΣPFAS) concentrations did not significantly differ among sampling events despite highly variable sample yields due to a heterogeneous and dynamic soil moisture regime. However, Log_{10} (ΣPFAS) concentrations were significantly higher in the shallow interval concordant with higher mean soil concentrations and higher total organic carbon (TOC) reflecting net retention, which is supported by soil-to-groundwater annual mass discharge estimates less than 0.2% of the total source mass for any given PFAS. PFAS-specific Log10 (soil-to-porewater ratios) significantly increased with soil concentration in both depth intervals contrary to concentration dependence resulting from the saturation of sorption sites potentially implicating self-assembly as an additional operative retention mechanism. Overall, these data validate the use of suction lysimeters for short-term site characterization deployments and emphasize the importance of in situ porewater samples for interrogating PFAS transport within source zones. *See presentation from 2021 Great Lakes PFAS Summit:*
https://us06web.zoom.us/rec/play/jRWpiLUSoVTbRWsPQ3HpW2b0lZlrcG41zkUvL2Hv4zvqgS4baV3gVKLI-GHepFW28rdjkQX4k_V7cYNDp.zWpR5Acf7Qdvk48p?continueMode=true&_x_zm_rtaid=6QGWBhjNQs6lXbotZdeyrQ.1667239310269.d17643a0

Research

COMPARISON OF RADIOCARBON- AND BACKGROUND LOCATION-CORRECTIONS ON SOIL-GAS CO_2 FLUX-BASED NSZD RATE MEASUREMENTS AT PETROLEUM IMPACTED SITES
Zimbron, J.A. I Groundwater Monitoring & Remediation 42(3):116-122(2022)

This work evaluates two available method corrections to measure natural source zone depletion (NSZD) rates. Carbon balance-based methods stoichiometrically convert measured soil-gas CO_2 flux related to contaminant degradation to equivalent contaminant mass loss. CO_2 flux-based methods require separating the fraction of the total CO_2 flux produced by NSZD from the fraction of CO_2 flux produced by natural soil processes (due to modern carbon turnover). The two methods distinguish the nature of the measured CO2 flux: (1) The background location correction subtracts a measurement from an unimpacted location from measurements collected at impacted locations, and (2) a location-specific radiocarbon (^{14}C) analysis that differentiates the modern and old carbon fractions of each total CO_2 measurement. Both correction approaches were evaluated using 36 measurements at impacted locations from five sites. The ^{14}C-corrected data shows that the magnitude and variability of the modern carbon-related fraction (noise) and the NSZD-related fossil fuel signal are similar, suggesting a location-specific correction is more valid. Only one sparsely vegetated and site showed close agreement between both corrections (^{14}C- and background location). Results highlight the strong effect of the correction method used on NSZD rate measurements and the importance of considering data quality on the subsequent data management process. https://ngwa.onlinelibrary.wiley.com/doi/epdf/10.1111/gwmr.12538?utm_source=google&utm_medium=paidsearch&utm_campaign=R3MR425&utm_content=EarthSpaceEnvirSci

AN INTEGRATED APPROACH FOR DETERMINATION OF TOTAL PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)
Shojaei, M., N. Kumar, and J.L. Guelfo. I Environmental Science & Technology 56(20):14517-14527(2022)

This study applied total oxidizable precursor (TOP) assay and semiquantitative (SQ) analysis to three aqueous film-forming foams (AFFFs) and three AFFF-impacted soils. In soils, the total PFAS estimated from an extraction method utilizing sequential acidic and basic solvents led to a 35% increase in precursors during TOP assay relative to results from a basic solvent-only extraction in one of three soils tested. However, concentrations did not increase significantly in the remaining soils. Sample-specific dilution schemes were required to overcome matrix effects caused by the acidic extraction step that influenced estimates of total PFAS by SQ analysis. Results highlight that there is no advantage to the routine application of an acid extraction step in PFAS-impacted soils. In three AFFFs, suspect screening of post-TOP samples identified eight classes of PFAS present after oxidation. Concentrations of three classes increased, suggesting new TOP endpoints. Concentrations of the remaining five classes either remained constant after TOP or exhibited slight decreases. As a result, combined TOP and SQ workstreams may yield the most representative assessment of total PFAS composition and concentration. The eight classes of PFAS present after TOP did not degrade in harsh conditions. Some are structurally similar to PFCAs and PFSAs and are known to occur in the environment, suggesting a similar degree of persistence and a need for more routine monitoring.

REMOVAL OF ARSENIC(III) AND CHROMIUM (VI) FROM CONTAMINATED WATER USING A LOW-COST CHITOSAN COATED POLYMERS
DeMessie, J., G. Sorial, and B. Mezgebe.
American Chemical Society National Meeting & Exposure, 12-24 August, Chicago, IL, 27 slides, 2022.

A novel adsorbent was developed by coating chitosan with Polyamide (PA, Nylon-12 nano-bead). The biosorbent was characterized by Fourier-transform infrared spectroscopy spectra, thermogravimetric analysis, surface charge analysis, and imaging techniques. Cr(VI) and As(III) removal were determined using inductively coupled plasma-atomic emission spectrometry. Equilibrium and column flow adsorption of As(III) and Cr(VI) on the biosorbent and the effect of pH, adsorbate concentration, and amount of adsorbent on the removal efficiency were investigated. Equilibrium data were fitted to Langmuir and Freundlich adsorption isotherms. The maximum monolayer adsorption capacities were 98.9 mg/L (Cr(VI)) and 21.5 mg/g (As(II)). Kinetics studies and column performance measured the effects of chitosan-PA for inlet Cr(VI) and As(III) solutions. The adsorbent's breakthrough curve was analyzed using the bed-depth service time Thomas model to define breakthrough behavior. Novel regeneration and reuse of exhausted adsorbents were achieved via a chelating ligand complex EDTA) solution, effectively lengthening the lifespan of the adsorbent. This adsorbent system could improve the quality and accessibility of water in developing countries.
https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=355716&Lab=CESER&simplesearch=0&showcriteria=2&sortby=pubDate&timstype=&datebeginpublishedpresented=06/15/2019&searchall=remediation

PYROLYSIS PROCESSING OF PFAS-IMPACTED BIOSOLIDS, A PILOT STUDY
Thoma, E.D., R.S. Wright, I. George, M. Krause, D. Presezzi, V. Villa, W. Preston, P. Deshmukh, P. Kauppi, and P.G. Zemek.
Journal of the Air & Waste Management Association 72(4):309-318(2021)

A limited-scope study investigated target PFAS removal of a commercial pyrolysis system processing biosolid by analyzing 41 target PFAS compounds in biosolids and biochar using two independent labs. The concentrations of 21 detected target compounds in the input biosolids ranged from ~2 µg/kg to 85 µg/kg. No PFAS compounds were detected in the biochar. The PFAS concentrations in the biochar were assumed to equal the compounds' minimum detection limits. The pyrolysis system's target PFAS removal efficiencies (REs) were estimated to range from >81.3% and >99.9% (mean >97.4%) with the lowest REs being associated with the lowest detected PFAS concentrations and the highest MDLs. No information on non-target PFAS compounds in influent or effluent media or products of incomplete combustion was considered. Selected gaseous emissions were measured by Fourier transform infrared spectroscopy and gas chromatography time-of-flight mass spectrometry to provide additional information on air emissions after process controls.

A PILOT STUDY CHARACTERIZING TETRACHLOROETHYLENE EXPOSURE WITH EXHALED BREATH IN AN IMPACTED COMMUNITY
Liu, S., E.Z. Yan, M.E. Turyk, S.S. Katta, A.F. Rasti, J.H. Lee, M. AlaJlouni, T.E. Wallace, W. Catt, and E.A. Aikins.
Environmental Pollution 297:118756(2022)

A study evaluated PCE in exhaled breath to identify and quantify exposure to PCE and to explore the extent and level of PCE exposure among community residents in Martinsville, Indiana. The city overlays four groundwater contamination plumes, including a Superfund site. The primary contaminants are PCE, TCE, and other VOCs. Chlorinated VOCs were measured in exhaled breath samples from 38 healthy individuals who lived either in a contamination area or outside any plume area. VOCs in indoor air were measured and tap water samples were collected from 10 homes. PCE was detected in all exhaled breath samples (mean: 6.6 µg/m^3; range: 1.9-44 µg/m^3) and tap water samples (mean: 0.74 µg/L; range: 0.39-0.92 µg/L). PCE was detected in six of nine (66%) homes with air concentrations ranging from 1.6 to 70 µg/m^3, exceeding the EPA action level of 42 µg/m^3. TCE and other chlorinated VOCs were not detected in these samples. PCE exposure occurred among individuals living on the EPA Superfund site, those living on other plume sites, and those living outside any known plume areas. Preventive measures should focus on identifying highly exposed groups and reducing their exposures, followed by addressing moderately elevated exposures in the community. Results demonstrate that PCE in exhaled breath can be used as an effective tool in community-engaged environmental health research to evaluate the extent and level of community exposure, increase awareness, and promote residents' participation in research and site cleanup decision-making.

APPLICATION OF NATIVE PLANTS IN CONSTRUCTED FLOATING WETLANDS AS A PASSIVE REMEDIATION APPROACH FOR PFAS-IMPACTED SURFACE WATER
Awad, J. G. Brunetti, A. Juhasz, M. Williams, D. Navarro, B. Drigo, J. Bougoure, J. Vanderzalm, and S. Beecham.
Journal of Hazardous Materials 429:128326(2022)

A study examined the hydroponic growth of *Juncus krausii*, *Baumea articulata* and *Phragmites australis* over 28 days to remediate PFOA- and PFOS-contaminated (0.2 µg/L to 30 µg/L) urban stormwater. With increasing PFOA and PFOS concentrations, accumulation in plant species increased, though root and shoot distribution varied depending on PFAS functional group. Less PFOA than PFOS accumulated in plant roots (0.006-0.16 versus 0.008-0.68 µg/g), while more PFOA accumulated in the plant shoots (0.02-0.55 versus 0.01-0.16 µg/g) indicating translocation to upper plant portions. *Phragmites australis* accumulated the highest overall plant tissue concentrations of PFOA and PFOS. The NanoSIMS data demonstrated that PFAS associated with roots and shoots was absorbed and not just surface bound. Results illustrate that constructed floating wetlands have the potential to reduce PFAS contaminants in surface waters.

General News

BIOSOLIDS AND PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)
Interstate Technology & Regulatory Council fact sheet, 4 pp, 2022

The Biosolids and Per- and Polyfluoroalkyl Substances Fact Sheet summarizes emerging technical information about risk and management for PFAS-impacted biosolids. It also discusses significant topics where the management and use of PFAS-containing biosolids may distribute PFAS into the environment, such as land application and landfills, mobility, leaching and transport, uptake into plants and biota.
https://pfas-1.itrcweb.org/wp-content/uploads/2022/10/Biosolids_PFAS_Fact_Sheet_102022_508.pdf

CLEANUP 2022: 9TH INTERNATIONAL CONTAMINATED SITE REMEDIATION CONFERENCE, PROGRAM AND PROCEEDINGS
CRC Care: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, Australia. ISBN: 978-1-921431-66-1, 634 pp, 2022

The 9th International Contaminated Site Remediation Conference was held at the Adelaide Convention Center in South Australia, September 11-15, 2022. A wide range of topics was covered, encompassing vapor intrusion, permeable reactive barriers, bioremediation, chemical oxidation, emerging contaminants, socio-economic drivers for remediation, environmental nanotechnologies, sustainable remediation, innovations in site characterization, and numerous case studies. Extended abstracts from the proceedings are available for review. https://www.dropbox.com/s/t5jlk9ahpoixw19/CleanUp_2022_proceedings_Rev_A_2UP_SEC_FINAL_10.09.22.pdf?dl=0

LONG-TERM PERFORMANCE EVALUATION OF ZERO-VALENT IRON AMENDED PERMEABLE REACTIVE BARRIERS FOR GROUNDWATER REMEDIATION - A MECHANISTIC APPROACH
Lawrinenko, M., S. Kurwadkar, and R.T. Wilkin.
Geoscience Frontiers [Published online 20 October 2022 before print]

This paper describes the underlying mechanisms of PRB performance and removes isolated misconceptions. The primary mechanisms of zero-valent iron (ZVI) transformation and aging in PRBs and the role of iron corrosion products are discussed. Numerous sites are reviewed to reinforce understanding of the interactions between groundwater contaminants and ZVI and the authigenic minerals that form within PRBs. ZVI corrosion products and mineral precipitates play critical roles in the long-term performance of PRBs by influencing the reactivity of ZVI. Pore occlusion by mineral precipitates occurs at the influent side of PRBs. It is enhanced by dissolved oxygen and groundwater rich in dissolved solids and high alkalinity, which negatively impacts hydraulic conductivity, allowing contaminants to potentially bypass the treatment zone. Further development of site characterization tools and models is needed to support effective PRB designs for groundwater remediation.

BUILDING TRUST AND RELATIONSHIPS IN CLEANUP COMMUNITY ENGAGEMENT, FROM THEORY TO PRACTICE
EPA Office of Research and Development, EPA/600/R-22/104, 48 pp, 2022

This report provides evidence for why and how to undertake community engagement during contaminated site remediation, removals, and redevelopment. It explains the science behind community engagement, trust, and building relationships and shares insights based on EPA research. Weaving together social science theory with data on engagement practices in different cultural and environmental contexts highlights the interconnections among community engagement, trust, and relationships throughout the cleanup. This report is intended for use by federal, state, local, and tribal practitioners working in Superfund, brownfields, emergency response, and other cleanup situations. In connecting theory with practice, it has several potential applications: a justification for investing in engagement, a framework for training or tabletop exercises, or a resource to prepare a community involvement plan. Since engagement, trust, and relationship building need to be tailored to the contaminated site, community, and cleanup stage at hand, these findings are not meant to be used as strict guidelines or best practices but are a superstructure that users can customize to their own situation.
https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=355943&Lab=CESER&simplesearch=0&showcriteria=2&sortby=pubDate&timstype=&datebeginpublishedpresented=06/15/2019&searchall=cleanup

SIMULTANEOUS MONITORING OF VOLATILE ORGANIC CONTAMINANT CONCENTRATION AND CONTROLLING FACTORS FOR VAPOR INTRUSION RISK EVALUATIONS-TWO SELECT CASES
Kram, M., B. Hartman, and C. Frescura. I Remediation 32(4):259-272(2022)

Continuous high-frequency monitoring platforms are deployed to concurrently track indoor concentrations of key volatile constituents, climatic conditions, and nominal pressure differential conditions that can result in toxic vapor transport and entry into buildings. The goal was to demonstrate how vapor intrusion reasonable maximum exposure (RME)-based risks can be successfully and efficiently characterized by documenting concentrations during advective chemical transport into buildings. Time series analyses of data from selected sites and time increments were compared to results expected from the most commonly employed sampling methods. These analyses indicate that time-weighted analyses, resulting conclusions, and risk-based decisions can vary depending on the sample timing. More specifically, these findings demonstrate that RME estimates will only be representative with a sufficient level of confidence when samples are collected at appropriate times. High-frequency monitoring of dynamic concentration and controlling factors and determination of a time-weighted concentration average over a selected duration concurrent with advective flux conditions allows for the derivation of a representative RME-based risk estimate. Furthermore, these variable temporal data patterns can prove insightful regarding cause-and-effect relationships.

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