

Technology Innovation News Survey

Entries for October 16-31, 2020

Market/Commercialization Information

ENVIRONMENTAL CONSULTING SERVICES IDIQ MATOC

U.S. Army Corps of Engineers (USACE), Kansas City District, Kansas City, MO.
Contract Opportunities at Beta.SAM, Solicitation W912DQ21R3005, 2020

This solicitation is set aside for 8(a)-eligible contractors under NAICS code 541620 for the performance of environmental consulting services across the USACE Northwestern Division's area of responsibility. The Government anticipates a target of five awardees under this multiple-award task-order contract (MATOC). Duration will be a basic ordering period of five years or until the \$9.9M contract limit is reached, whichever comes first. Orders will be firm fixed price. This IDIQ contract will support environmental consulting services needs for both military and civilian agencies of the federal government, including the Defense Environmental Restoration Program (both Army and Air Force Installation Restoration Program and the Formerly Used Defense Sites); U.S. EPA, including the Superfund and Brownfields programs; environmental compliance, range work, natural resources management, conservation, and pollution prevention projects under DoD's Environmental Quality Program; the Formerly Utilized Sites Remedial Action Program; the Base Realignment and Closure Program; USACE civil works projects; DoD sustainment, restoration, and modernization projects; and work for other federal agencies. Offers are due by 2:00 PM CT on December 16, 2020. <https://beta.sam.gov/opp/9005d62b3855428ca7e7ed7342473663/view>

A-E ENVIRONMENTAL SUPPORT SERVICES FOR NAVY CLEAN

Naval Facilities Engineering Command Atlantic, Norfolk, VA.
Contract Opportunities at Beta.SAM, Solicitation N62470-20-R-2005, 2020

This procurement is unrestricted under NAICS code 541330. All information needed for interested parties to submit an SF-330 (Architect-Engineer Qualifications) is contained in the beta.sam notice and its attachments. This procurement will result in one cost-plus-award-fee IDIQ A-E contract for environmental engineering support services for the Comprehensive Long-Term Environmental Action Navy (CLEAN) in NAVFAC Atlantic's area of responsibility. The A-E program management and technical environmental services will support the Navy's Environmental Restoration Program, including the Installation Restoration Program, the Munitions Response Program, and other similar programs at any Navy or Marine Corps site within NAVFAC Atlantic's AOR, principally encompassing the states of Alabama, Arkansas, Connecticut, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Mississippi, Missouri, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, and Wisconsin. Duration will be a base period of one year and four one-year options under a contract ceiling of \$400M. SF-330 packages are due no later than 2:00 PM ET on December 23, 2020, via the DoD Secure Access File Exchange (SAFE) application. <https://beta.sam.gov/opp/d4878bae443a44439c591b95fe3bbe2a/view>

A-E ENVIRONMENTAL SERVICES IDC

U.S. Army Corps of Engineers, Tulsa District, Tulsa, OK.
Contract Opportunities at Beta.SAM, Solicitation W912BV-21-S-2025, 2020

This sources sought is issued for market survey information only, to be used for acquisition strategy planning. The USACE Tulsa District has been tasked on behalf of the Regional Planning and Environmental Planning Center to solicit and award A-E contracts for environmental services primarily within the military and civil boundaries (Texas, Oklahoma, Louisiana, southern Kansas and select installations of New Mexico) of the USACE's Southwestern Division and as assigned. The proposed acquisitions will be competitive, firm-fixed-price indefinite-delivery contracts. The purpose of this synopsis is to gain knowledge of the interest, capabilities and qualifications of small business community contractors -- e.g., 8(a), HUBZone, service-disabled veteran-owned, or woman-owned small business -- capable of performing a wide range of environmental A-E services for work that includes investigations, surveys, and studies in the areas of RCRA, CERCLA, NEPA and MEC. Contract period of performance is a 5-year base and a 2-year option, not to exceed \$150M in capacity. A request for SF-330s for selection evaluation is anticipated in the March/April 2021 timeframe. Firms interested in responding to this notice must complete the on-line questionnaire at Survey Monkey before 5:00 PM CT on Tuesday, January 5, 2021. <https://beta.sam.gov/opp/e323a905332d449fa958ab7304513b61/view>

NIAGARA FALLS STORAGE SITE ENGINEERING DESIGN AND CONSTRUCTION OVERSIGHT SERVICES

U.S. Army Corps of Engineers, Buffalo District, Buffalo, NY.
Contract Opportunities at Beta.SAM, Solicitation W912P420R0007, 2020

This procurement is open to all businesses regardless of size. All information needed for interested parties to submit an SF-330 (A-E Qualifications) is contained in the beta.sam notice and its attachment. Award will result in one IDIQ A-E contract having a five-year term with a five-year option for a total of 10 years under a ceiling of \$35M. Subject to the provisions of CERCLA, the Niagara Falls Storage Site remediation project addresses radiological and chemical contamination identified in three operable units: (1) the Interim Waste Containment Structure (IWCS), a 10-acre engineered landfill containing highly radioactive residues and other waste; (2) Balance of Plant comprising all of the contaminated material at the site not in the IWCS and excluding groundwater; and (3) contaminated groundwater. Estimated start date is July 2021. SF-330 packages are due by 2:00 PM ET on January 7, 2021, via the DoD Secure Access File Exchange (SAFE) application. <https://beta.sam.gov/opp/52c851d3aa144cee807ab80994bd2ec8/view>

DEPARTMENT OF ENERGY EM PROCUREMENT SCHEDULE UPDATE

U.S. DOE, EM Consolidated Business Center, Cincinnati, OH.
Contract Opportunities at Beta.SAM, 2020

For the Moab Remedial Action Contract and Oak Ridge Reservation Cleanup procurements, DOE-EM expects to proceed with reasonable acquisition schedules and revised process considerations as necessary due to enhanced telework, social distancing, and travel restrictions. Final RFP releases will be staggered and proposal preparation time periods may be extended. Final RFP release dates are anticipated no sooner than December 2020 for the Oak Ridge Reservation Cleanup (Solicitation number 89303319REM000047) and January 2021 for the Moab RAC (Solicitation number 89303320REM000066). NAICS code 562910 is applicable to both. This information is subject to further change based on continued COVID-19 impacts. <https://beta.sam.gov/opp/2010dc2c451145b08227dfe0977f82cd/view>

Cleanup News

OPTIMIZED CLEANUP OUTCOMES THROUGH PROACTIVE COMBINED REMEDIATION

Dombrowski, P.M. | Design and Construction Issues at Hazardous Waste Sites Virtual Meeting, 26-28 October, 22 slides, 2020

Combined remediation approaches were proactively planned for several projects to identify synergies in treatment and limit inhibitory effects. The presentation includes regulatory considerations, reaction byproducts, contaminant mobilization, spatial and sequential combined remediation application, and combined remedy remediation projects where additional technologies were applied reactively. Example combinations designed proactively and implemented include in situ chemical oxidation (ISCO) with bioremediation via enhanced reductive dechlorination, ISCO applying two different oxidants, and incorporation of surfactants to enhance in situ remediation.

Slides: https://clu-in.org/conf/tio/DCHWS10/slides/6Slide_Presentation_for_Paul_Dombrowski_ISOTEC_Remedial_Technologies.pdf

Longer abstract: <https://clu-in.org/conf/tio/DCHWS10/Panel2.Dombrowski.abstract.pdf>

COST-EFFECTIVE DESTRUCTION OF PETROLEUM HYDROCARBON CONTAMINANTS WITH EXPEDITED RESIDUAL MASS – SMEAR ZONE (LNAPL) DESTRUCTION UNDER ANAEROBIC CONDITIONS VIA BIOSTIMULATION

Armstrong, K. | REMTECH 2020: The Remediation Technologies Symposium, 14-15 October, Virtual Meeting, abstract, 2020

This presentation summarizes three projects conducted at Chanute Air Force Base using TPEnhanced™, a nitrate-based additive combined with proprietary macro-micro inorganic nutrients, for biostimulation treatment of LNAPL-contaminated media. The goals included enhanced respiration of indigenous heterotrophic bacteria, expedited solubilization of the residual source mass (LNAPL), and enhanced dissolved-phase petroleum hydrocarbon (PHC) destruction.

Slides: <https://www.esaa.org/wp-content/uploads/2020/11/RT2020-Armstrong.pdf>

Longer abstract: <https://www.esaa.org/wp-content/uploads/2020/10/45-R1-2020-Armstrong.pdf>

For all site documents, including fact sheets, of the Chanute Air Force Base remediation, see <https://www2.illinois.gov/epa/topics/community-relations/sites/chanute-afb/Pages/fact-sheet-3.aspx>

COLLOIDAL ACTIVATED CARBON USED TO REDUCE PFAS AND CHLORINATED SOLVENT CONCENTRATIONS IN GROUNDWATER TO BELOW DETECTION LIMITS AT A MICHIGAN ARMY NATIONAL GUARD SITE

Moore, R. | Design and Construction Issues at Hazardous Waste Sites Virtual Meeting, 26-28 October, 35 slides, 2020

In 2016, PFAS were found commingled with a chlorinated solvent plume at the Grayling Army Airfield in Michigan that was migrating towards the property boundary. A single application of PlumeStop in an in-situ reactive barrier was used to remediate PFAS. Monitoring results demonstrated that PlumeStop

distribution was achieved using direct-push injection, and PFAS and chlorinated solvent concentrations were reduced to below laboratory detection limits within one month. Concentration reductions were sustained for over 1.5 years.

Slides: [https://clu-in.org/conf/tio/DCHWS10/slides/3Slide Presentation for Ryan Moore \(YM\), REGENESIS.pdf](https://clu-in.org/conf/tio/DCHWS10/slides/3Slide Presentation for Ryan Moore (YM), REGENESIS.pdf)

Longer abstract: https://clu-in.org/conf/tio/DCHWS10/DCHWS.Panel1.AugmentingP&T.submittedabstracts1_rm.pdf

NOVEL RIVERBANK CAP FOR CONTROLLING PETROLEUM LNAPL SHEEN AND DISSOLVED-PHASE CONSTITUENT DISCHARGE

Sheets, K. J., Gentry, S. Martin, K. Morgan, and T. Sale

Design and Construction Issues at Hazardous Waste Sites Virtual Meeting, 26-28 October, 28 slides, 2020

An upland release of LNAPL caused occasional sheens on a portion of the Willamette River within the Portland Harbor Superfund Site. Installation of a fiber-reinforced polymer sheet pile barrier wall and hydraulic containment wells diminished the intensity and frequency of sheens but did not fully eliminate them. Therefore, a novel, multilayered cap was designed and constructed, consisting of an oleophilic biobarrier to mitigate sheen augmented with an activated carbon layer to capture dissolved-phased contaminants. Sheening was eliminated shortly after the first phase of cap installation, and no sheens have been observed since completing the cap. The final cap met additional Record of Decision requirements, including no net-fill or net-rise within the 100-year floodplain and beneficial habitat preservation.

Slides: <https://clu-in.org/conf/tio/DCHWS12/slides/3Slide Presentation for Keith Sheets, P.G.; Jacobs.pdf>

Longer abstract: https://clu-in.org/conf/tio/DCHWS12/Sheets_Updated_Abstract-KS.pdf

USE OF PHYTOREMEDIATION TO AUGMENT STANDARD PUMP AND TREAT TECHNOLOGIES AT SUPERFUND SITES

Brown, N.J. | Design and Construction Issues at Hazardous Waste Sites Virtual Meeting, 26-28 October, 19 slides, 2020

A plume of PCB- and TCE-contaminated groundwater at the LaSalle Electrical Utilities Superfund site was captured using conventional pumping and treatment. However, investigations determined that the contaminant migration was slower than model predictions and additional VOC source areas were present. Therefore, two phytoremediation systems were installed (1,000 trees total) to augment the pump and treat system: one located in the northwest corner of the site to address TCE-contaminated groundwater with fast-growing poplar, willow, and bald cypress trees; and one installed along the eastern side of the groundwater treatment unit to enhance collection of the TCE plume with fast-growing poplars and willows. During the first full growing season, the average tree took up ~210 gals of groundwater for a total of ~209,000 gals of groundwater. After several growing seasons, the phyto-plot successfully reduced shallow groundwater contamination below site-specific groundwater risk-based remediation goals allowing for site closure.

Slides: <https://clu-in.org/conf/tio/DCHWS10/slides/1Slide Presentation for Neil J. Brown, Ecology and Environment Engineering and Geology, P.C..pdf>

Longer abstract: https://clu-in.org/conf/tio/DCHWS10/DCHWS.Panel1.AugmentingP&T.submittedabstracts_njb.pdf

Demonstrations / Feasibility Studies

LONG-TERM STABILITY AND EFFICACY OF HISTORIC ACTIVATED CARBON (AC) DEPLOYMENTS AT DIVERSE FRESHWATER AND MARINE REMEDIATION SITES

Bridges, T., S. Newell, A. Kennedy, D. Moore, U. Ghosh, T. Needham, H. Xia, K. Kim, et al., U.S. Army Corps of Engineers Engineer Research and Development Center, Document No: ERDC/EL TR-20-9, 98 pp, 2020

The long-term performance of activated carbon (AC) was assessed at two pilot-scale demonstration sites, Grasse River in NY, and Canal Creek, Aberdeen Proving Ground (APG) in MD, representing two distinct physical environments. Sediment core samples were collected after 6 years (APG) and 10 years (Grasse River) of remedy implementation. Core samples were sectioned to determine the current vertical distribution and persistence of AC in the field. The concentration profile of PCBs in sediment pore water with depth was measured using passive sampling. Sediment samples from the untreated and AC-treated zones were also assessed for bioaccumulation in benthic organisms. The data collected enabled comparison of AC distribution, PCB concentrations, and bioaccumulation measured over the short- and long-term (months to years).

<https://erdc-library.erdcren.dren.mil/jspui/bitstream/11681/38781/1/ERDC-EL%20TR-20-9.pdf>

SIMPLE RESISTIVITY PROBE SYSTEM FOR REAL-TIME MONITORING OF INJECTED REAGENTS

Stevenson, D., F. Solano, Y. Wei, N.R. Thomson, J.F. Barker, and J.F. Devlin.

Groundwater Monitoring & Remediation [Published online 28 September 2020 prior to print]

A prototype real-time monitoring probe – a dipole resistivity probe (DRP) – was designed and tested to provide remediation practitioners with additional information on the distribution of injected reagents. Static cell and sandbox experiments were conducted to test and refine the DRP design before field testing. Results from two field studies demonstrated the utility of the DRPs to generate information regarding the arrival and persistence of reagents efficiently and cost-effectively. The first field study used a network of DRPs to monitor the land application of a sodium sulfate solution. The second field study employed DRPs to monitor the distribution and longevity of a persulfate solution.

LABORATORY-SCALE AND PILOT-SCALE STABILIZATION AND SOLIDIFICATION (S/S) REMEDIATION OF SOIL CONTAMINATED WITH PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Sorengard, M., P. Gago-Ferrero, D.B. Kleja, and L. Ahrens.

Journal of Hazardous Materials 402:123453(2021)

S/S treatment was evaluated at pilot-scale using six tons of soil contaminated with PFAS-containing aqueous film-forming foam. The test simulated 6 years of precipitation to see how much PFAS would be removed from the various treated and untreated media. PFAS removal rate from leachate was >97 % for PFHxA, PFOA, PFHxS, and PFOA, but 3% for short-chain PFPeA. While PFAS sorption strength increased 2- to 40-fold for both reference and S/S-treated soil in the pilot test compared to lab-scale tests, PFAS behavior in both tests was generally well-correlated. Seven PFASs were tentatively identified using an automated suspect screening approach. Among these, perfluorohexanesulfonamide and 3:2 fluorotelomer alcohol (

IRON-BASED SUBSURFACE ARSENIC REMOVAL (SAR): RESULTS OF A LONG-TERM PILOT-SCALE TEST IN VIETNAM

Kurz, E.E.C., V.T. Luong, U. Hellriegel, F. Leidinger, T.L. Luu, J. Bundschuh, and J. Hoinkis.

Water Research 181:115929(2020)

A pilot-scale SAR plant was tested in the Mekong Delta, Vietnam for Fe, As, and Mn removal over two years. Initial concentrations of Fe (8.4 ± 1.3 mg/L) and As (81 ± 8 µg/L) in the exploited groundwater were successfully lowered to below World Health Organization guideline value limits for drinking water. Adsorption and co-precipitation of As with Fe-(hydr)oxides were the principal mechanism responsible for As removal. Naturally occurring geochemical reducing conditions and high ammonium levels in the groundwater delayed the removal of Mn. An additional post-treatment filtration to remove Mn was temporarily used to comply with the Vietnamese drinking water standard until the SAR process achieved Mn mitigation.

IN SITU CATCHMENT SCALE SAMPLING OF EMERGING CONTAMINANTS USING DIFFUSIVE GRADIENTS IN THIN FILMS (DGT) AND TRADITIONAL GRAB SAMPLING: A CASE STUDY OF THE RIVER THAMES, UK

Wang, R., E. Biles, Y. Li, M.D. Juergens, M.J. Bowes, K.C. Jones, and H. Zhang.

Environmental Science & Technology 54(18):11155-11164(2020)

DGT and grab sampling were compared for their suitability to screen and monitor emerging contaminants (ECs) at the catchment scale in the River Thames system. The study also explored their sources and environmental fate. Triethyl phosphate (summer 13-160 ng/L and winter 18-46 ng/L) and tris(chloropropyl) phosphate (summer 242-4282 ng/L and winter 215-854 ng/L) were the main organophosphate esters (OPEs) in the study area. DGT and grab sampling were in good agreement for chemicals that were relatively stable in the rivers. DGT provided a better integral of loadings and exposure than grab sampling for chemicals that showed high water body variation. DGT was not as sensitive as grab sampling under the procedures employed here, but there are several options to improve it to give comparable/better performance.

Research

A NEW DATASET OF PCB HALF-LIVES IN SOIL: EFFECT OF PLANT SPECIES AND ORGANIC CARBON ADDITION ON BIODEGRADATION RATES IN A WEATHERED CONTAMINATED SOIL

Terzaghi, E., E. Alberti, G. Raspa, E. Zanardini, C. Morosini, S. Anelli, S. Armiraglio, et al.

Science of The Total Environment 750:141411(2021)

A dataset of PCB half-lives in soil was derived from a greenhouse experiment using 10 different treatments (a combination of seven plant species and different soil conditions) to stimulate biodegradation in PCB-contaminated soil from a site in Northern Italy over 18 months. The tests were conducted under semi-field conditions. Tall fescue, tall fescue cultivated with pumpkin, and tall fescue amended with compost reduced >50% of the 79 measured PCB congeners, including the most chlorinated ones. No plant species was uniquely responsible for the effective degradation of all isomeric classes and congeners. The obtained half-lives ranged from 1.3-5.6 years and were up to a factor of 8 lower compared to generic half-life values reported in literature. This new dataset could improve soil remediation time predictions, multimedia fate, the long-range transport of PCBs, and help evaluate the food chain transfer and the exposure and potential for effects on ecosystems.

INFLUENCE OF REMEDIATION ON SEDIMENT TOXICITY WITHIN THE GRAND CALUMET RIVER, INDIANA, USA

Stevens, J.A., J.M. Besser, R.A. Dorman, and D.W. Sparks.
Chemosphere 249:126056(2020)

Sediments contaminated with metals and toxic organic compounds in the Grand Calumet River (GCR) were remediated using a combination of removal, activated carbon and organoclay amendments, and capping with sand or relatively uncontaminated sediment. This study determined the influence of sediment remediation on concentrations of chemical contaminants and toxicity to sediment-dwelling organisms. Remediated sediments generally had lower levels of PAHs, PCBs, and metals, although sediments from the U.S. Steel area still had elevated levels of PAH, PCB, and chromium. Remediated sediments and reference site sediments showed significantly reduced toxic effects in short-term sediment bioassays, compared to unremediated sites.

SELECTIVE ARSENIC REMOVAL FROM GROUNDWATERS USING REDOX-ACTIVE POLYVINYLFERROCENE-FUNCTIONALIZED ELECTRODES: ROLE OF OXYGEN

Song, Z., S. Garg, J. Ma, and T.D. Waite.
Environmental Science & Technology 54(19):12081-12091(2020)

Selective As sorption from simulated groundwaters at a pH of 8 by a redox-active polyvinylferrocene-functionalized electrode was investigated using a modified double potential step chronoamperometry method. Results showed that $91.8 \pm 0.6\%$ of As(III) could be selectively removed from simulated groundwater over 10 cycles at an ultralow energy consumption of 0.12 kWh/m³.

PER- AND POLYFLUOROALKYL-CONTAMINATED FRESHWATER IMPACTS ADJACENT RIPARIAN FOOD WEBS

Koch, A., M. Jonsson, L.W.Y. Yeung, A. Karrman, L. Ahrens, A. Ekblad, and T. Wang.
Environmental Science & Technology 54(19):11951-11960(2020)

The cross-boundary transfer of PFASs from the aquatic environment to the riparian zone via emergent aquatic insects was investigated at a PFAS-contaminated pond in Sweden. Aquatic and terrestrial invertebrates, surface water, sediments, soils, and plants were analyzed for 24 PFASs, including branched isomers. Elevated Σ 24 PFAS concentrations in aquatic insect larvae ranged from 1100-4600 ng/g dry weight (dw) and remained high in emerged adults (120-3500 ng/g dw), indicating exposure risks for top predators that prey in riparian zones. In terrestrial invertebrate consumers, PFAS concentrations increased with the degree of aquatic-based diet and at higher trophic levels. Stable isotope data and calculated bioaccumulation factors indicated that bioconcentration of PFASs was the major pathway of exposure in the aquatic food web and bioaccumulation in the riparian food web.

ESTIMATING MOBILE-IMMOBILE MASS TRANSFER PARAMETERS USING DIRECT PUSH TOOLS

Borden, R., R. Falta, G. Liu, and J.J. Butler, Jr., SERDP Project ER-2529, 213 pp, 2020

A suite of field and modeling approaches were developed to allow users to better characterize low-hydraulic conductivity (K) zones, accurately simulate mass transfer between low-K and high-K zones, and evaluate the impact of these processes on the time to reach groundwater cleanup goals following source removal. Objectives included: 1) developing low-cost direct push methods for high-resolution characterization of spatial variations in K and porosity; 2) high-resolution characterization and solute transport modeling to evaluate the ability to simulate back-diffusion processes; 3) developing methods to calibrate existing and new mobile-immobile zone models; and 4) developing simplified methods to estimate the impact of matrix diffusion on cleanup time.
<https://www.serdp-estcp.org/content/download/52059/512268/file/ER-2529%20Final%20Report.pdf>

ELECTROCHEMICAL TRANSFORMATION OF AN AGED TETRACHLOROETHYLENE CONTAMINATION IN REALISTIC AQUIFER SETTINGS

Hyldegaard, B.H., R. Jakobsen, and L.M. Ottosen.
Chemosphere 243:125340(2020)

To assess the potential for applying electrochemistry, a stepwise investigation was conducted to determine the influence of field-extracted groundwater, sandy sediment, and groundwater aquifer temperatures on remediation of aged, partially-degraded PCE at a typical groundwater flow rate. pH and conductivity were unaffected downgradient the electrochemical zone at a constant current of 120 mA. Major groundwater species were reduced and oxidized. Hydrogen peroxide was formed in levels up to 5 mg/L with limited distribution into the sandy sediment. Trichloromethane was formed by oxidation of organic matter in the sandy sediment in the presence of chloride. The more realistic the settings, the higher the PCE removal, decreasing concentrations to $7.8 \pm 2.3 \mu\text{g/L}$. Complete TCE and *cis*-1,2-DCE removal were obtained. Competing reactions related to the natural complex hydrogeochemistry were insignificant in affecting the electrochemical degradation of PCE and chlorinated intermediates.

TRANSPORT OF GENX IN SATURATED AND UNSATURATED POROUS MEDIA

Yan, N., Y. Ji, B. Zhang, X. Zheng, and M.L. Brusseau.
Environmental Science & Technology 54(19):11876-11885(2020)

The retention and transport behavior of GenX was investigated in five natural porous media with similar median grain diameters but different geochemical properties. Surface tension measurements showed that the impact of solution composition was greater for the ammonium form of GenX than for the acid form due to the presence of the NH₄ counterion. While breakthrough curves for experiments conducted under saturated conditions were asymmetrical, curves for experiments conducted under unsaturated conditions exhibited greater retardation from the impact of adsorption at the air-water interface. The magnitudes of solid-phase adsorption were relatively small, and the highest adsorption was associated with the medium containing the highest amount of metal oxides. The contributions of air-water interfacial adsorption to GenX retention ranged from ~24% to ~100%. The overall magnitudes of retardation were relatively low, with retardation factors <3, indicating that GenX has significant migration potential in soil and the vadose zone.

REMEDICATION OF CONTAMINATED INTERTIDAL SEDIMENT BY INCREASING PERMEABILITY USING ACTIVE CAPPING MATERIAL

Kim, K. and K. Kim. | Journal of Environmental Management 253:109769(2020)

The potential to remediate clayey sediments in intertidal zones was investigated by increasing the soil permeability using granulated coal ash (GCA) as an active capping agent. The GCA increased the sediment's permeability coefficient by a factor of seven, changing the properties from typical clayey silt to that of silt. Increased permeability was attributed to Ca²⁺ ions, and adsorbed Na⁺ was immediately discharged, leading to a decrease in the sodium adsorption ratio. The activated flow of pore water stimulated nutrient loadings. PO₄-P and NH₄-N loads decreased by 55% and 44%, respectively. The GCA increased the dissolved oxygen by 1.8 mg/L and increased the redox potential in pore water from -370 to -306 mV vs. Ag/AgCl.

COMPARISON OF TWO INOCULATION METHODS OF ENDOPHYTIC BACTERIA TO ENHANCE PHYTODEGRADATION EFFICACY OF AN AGED PETROLEUM HYDROCARBONS POLLUTED SOIL

Pawlik, M., T. Płociniczak, S. Thijs, I. Pintelon, J. Vangronsveld, and Z. Piotrowska-Seget.
Agronomy 10(8):1196(2020)

Two types of endophyte inoculations were tested in *Lolium perenne* growing in an aged petroleum hydrocarbon (PHC)-polluted soil. The two methods investigated were direct soil inoculation and pre-inoculation of the caryopses followed by soil inoculation. *Rhodococcus erythropolis* 5WK and *Rhizobium* sp. 10WK endophytes were applied individually and in combination. The highest PHC removal was achieved after pre-inoculation of ryegrass caryopses with a consortium of both bacterial strains. Both strains established in the aged-polluted soil, colonized the roots and shoots of *L. perenne*, and showed selective colonization of the environment compartments. The inoculation method determined the efficiency of the phytodegradation process, especially the rate of PHC degradation. This article is **Open Access** at <https://www.mdpi.com/2073-4395/10/8/1196>.

General News

SUPERFUND OPTIMIZATION PROGRESS REPORT

EPA Office of Land and Emergency Management, EPA-542-R-20-002, 77 pp, 2020

EPA's optimization program has continued to make cleanups more efficient and effective and has spurred the Superfund program forward by (1) implementing recommendations provided in the Superfund Task Force Recommendations, including Recommendation 71, which promotes the use of third-party optimization; (2) implementing elements of the National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion; (3) implementing recommendations for individual optimization reviews and conducting site-specific technical support projects; and (4) implementing innovative best practices throughout the Superfund pipeline. This report provides updates on the status of optimization reviews conducted during FY 2015 through FY 2017 and includes optimization-related technical support projects that were substantially completed through 2018. Project highlights demonstrate results achieved from optimization reviews and optimization-related technical support projects and exemplify how the optimization program applies and promotes best practices to improve site cleanup. <https://semsub.epa.gov/work/HO/100002585.pdf>

ASSESSING THE LONG-TERM PERFORMANCE AND IMPACTS OF ISCO AND ISBR REMEDIATION TECHNOLOGIES

Brusseau, M.L., ESTCP Project ER-201585, 2 pp, 2020

Fracturing-enhanced in situ bioremediation (ISBR) was assessed at the Air Force Plant 44, which is contaminated by TCE, 1,4-dioxane, and chromium. The site comprises several primary source zones and a large, several km-long, groundwater contaminant plume in the regional aquifer. Performance monitoring data were obtained for a period of greater than three years after the completion of ISBR. The project focused on treating the interface between the vadose zone and saturated zone. The study tested ISBR employing enhanced reductive dechlorination and ISBR employing enhanced aerobic cometabolism.

<https://www.serdp-estcp.org/content/download/52058/512258/file/ER-201585%20Fact%20Sheet.pdf>

DEMONSTRATION OF A LONG-TERM SAMPLING AND NOVEL ANALYSIS APPROACH FOR DISTINGUISHING SOURCES OF VOLATILE ORGANIC COMPOUNDS IN INDOOR AIR

Rossner, A., ESTCP Project ER-201504, 16 pp, 2020

The new Aura™ capillary canister sampling method captures both canisters and sorbent samplers' advantages without their limitation by allowing for longer-term (1-3 weeks) sample collection and characterization of average VOCs in buildings at risk for vapor intrusion. The approach is robust, comparable in cost or is less expensive than current methods, allows for long-term sample collection, and requires one sample to capture the full range of analytes and concentrations of interest. Sampling does not require a power source, and analysis does not require solvent desorption. This new technology has been researched for well over a decade and was recently commercialized.

<https://www.serdp-estcp.org/content/download/52041/512077/file/ER-201504%20User%20Guide.pdf>

POST-REMEDATION PERFORMANCE ASSESSMENT AT A PETROLEUM IMPACTED SITE

Popovic, J., J. Segura, T. Lewis, C. Newell, and P. Kulkarni, ESTCP ER-201582, 174 pp, 2020

A field demonstration was completed at Naval Air Station (NAS) Fallon to test three methods to assess LNAPL remaining at a petroleum-impacted site and provide guidance for future application at other DoD sites. Results indicated that active LNAPL recovery could potentially be discontinued without changing the low-risk profile at the site. Costs were evaluated to determine what a similar investigation would cost to complete to assess the remaining LNAPL and determine a more cost-effective path forward for a site. As part of the cost assessment, transition to natural source zone depletion/monitored natural attenuation was compared with traditional free product recovery methods implemented to recover and manage LNAPL at impacted sites.

<https://www.serdp-estcp.org/content/download/51709/508635/file/ER-201582%20Final%20Report.pdf>

PFAS AND AQUEOUS FILM-FORMING FOAMS: AN ONGOING CHALLENGE FOR THE PETROCHEMICAL INDUSTRY

Chandramouli, B., M. Woudneh, and C. Hamilton.

IPEC 2019: 26th Annual International Petroleum Environmental Conference, 7-9 October 2019, San Antonio, Texas, 25 slides, 2019

This presentation details a sensitive isotope dilution liquid chromatography with tandem mass spectrometry approach to measure PFOA, PFOS, and 27 other PFAS in aqueous film-forming foams. The method was developed and validated in collaboration with the Firefighting Foam Coalition and DoD. The presentation includes sampling recommendations, information on current and upcoming international regulations, and recommendations for non-target analysis to look for "dark matter" PFAS that can result in future contamination liability.

<https://cese.utulsa.edu/wp-content/uploads/2019/11/IPEC-2019-B-ChandramouliIPEC2019PresentationFinal.pdf>

ENDOPHYTE-ASSISTED PHYTOREMEDIATION: MECHANISMS AND CURRENT APPLICATION STRATEGIES FOR SOIL MIXED POLLUTANTS

He, W., M. Megharaj, C.-Y. Wu, S.R. Subashchandrabose, and C.-C. Dai.

Critical Reviews in Biotechnology 40(1):31-45(2020)

This review summarizes the taxa and physiological properties of endophytic microorganisms that may help detoxify contaminant mixtures. The discussion includes potential biomolecules that may enhance endophyte-mediated phytoremediation and practical applications of pollutant-degrading endophytes, and current strategies for applying the bio-resource for soil phytoremediation.

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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