

Technology Innovation News Survey

Entries for April 16-30, 2021

Market/Commercialization Information

MUNITIONS RESPONSE ACTIONS AT VIEQUES, PUERTO RICO
Naval Facilities Engineering Systems Command Atlantic, Norfolk, VA.
Contract Opportunities at SAM.gov, Solicitation N624702R2004, 2021

This solicitation is a 100% small business set-aside under NAICS code 562910 (Remediation Services) with a small business size standard of 750 employees. NAVFAC Atlantic intends to award a cost-plus-award-fee IDIQ contract for one base year and four one-year options with a total maximum value of \$95M. Potential tasks will include field surveys; site visits; interviews with knowledgeable persons; work plans, sampling and analysis plans, and quality assurance plans; safety and health plans; evaluation and remediation of environmental contamination; completion of after-action reports; investigation reports; site monitoring; removal and remedial actions, including disposition of recovered munitions and associated materials; and innovative technologies. Offers are due by 4:00 PM ET on June 21, 2021. <https://sam.gov/opp/698373a13b29a3b49d9e6d4538e4f41/waw>

IDIQ FIXED-PRICE REMEDIAL ACTION CONTRACT (FRAC) #7: VARIOUS SITES IN THE NAVFAC PACIFIC AREA OF RESPONSIBILITY

Naval Facilities Engineering Systems Command Pacific, JBPHH, Hawaii.
Contract Opportunities at SAM.gov, Solicitation N62742-21-R-1801, 2021

This is a total small business set-aside under NAICS code 562910. The intent is to award approximately three to five IDIQ firm-fixed-price type contracts resulting from this solicitation under an aggregate ceiling of \$120M. The purpose of this procurement to obtain services for performing remedial actions at environmentally contaminated sites located predominately at Navy and Marine Corps installations and other Government agencies. The sites will consist of those ranked on the Superfund NPL as well as non-NPL sites, RCRA, underground storage tanks, operational small arms firing ranges, and other sites that might require remedial action. The work will be performed mainly at various sites within the Naval Facilities Engineering Systems Command (NAVFAC) Pacific area of responsibility (NAVFAC Hawaii, NAVFAC Marianas, NAVFAC Far East, NAVFAC Northwest, and NAVFAC Southwest). Contractors must be duly authorized to operate and conduct business in any host country. Total duration of this contract, including the exercise of any options, shall not exceed 102 months. Offers are due by 2:00 PM Hawaii Time on June 21, 2021. <https://sam.gov/opp/6a3f26e8c7274345eb97446311665379d/waw>

"DOMESTIC WHOLE-HOUSE FILTER (WHF) SYSTEMS FOR GROUNDWATER AT MOSES LAKE WELLFIELD SUPERFUND SITE" LOCATED IN MOSES LAKE, WA

U.S. Army Corps of Engineers, Seattle District, Seattle, WA.
Contract Opportunities at SAM.gov, Solicitation W912DZW1R0035, 2021

This is a total small business set-aside requirement under NAICS code 221310 for a non-personal services contract to install and maintain (as needed) whole-house filter systems to provide filtration of trichloroethene (TCE)-contaminated groundwater supplied to residences in Moses Lake, Washington. Offers are due by 9:00 AM PT on June 22, 2021. <https://sam.gov/opp/3a3d13b9d6d455eef5c5b74e376d07f1/waw>

TECHNICAL AND ADMINISTRATIVE PROGRAM SUPPORT FOR THE WATER PERMITS DIVISION

U.S. EPA, Cincinnati Acquisition Division, Cincinnati, OH.
Contract Opportunities at SAM.gov, Solicitation 68HRC20R0088, 2021

This requirement is unrestricted under NAICS code 541620. The purpose of this contract is to provide environmental consulting support services to EPA's Office of Wastewater Management, Water Permits Division in developing and implementing the National Pollutant Discharge Elimination System (NPDES) permitting program and regulations. The Clean Water Act established the NPDES permitting program as a permit system for regulating point sources of pollution, such as industrial and municipal facilities. This contract provides technical support associated with amending, developing, and implementing the NPDES programs, permits, and regulations. This is an IDIQ contract with a period of performance of five years from date of award, with an additional 12 months for completion of task orders issued during this period. Both firm-fixed-price and cost-plus-fixed-fee task orders will be issued. Maximum amount of orders shall not exceed \$38,119,586. Offers are due by 4:30 PM ET on June 25, 2021. <https://sam.gov/opp/ab60e5f628f41c7a87033501b428777/waw>

ARNG ENVIRONMENTAL CLEANUP SUPPORT

Department of Defense, Alaska District, Funding Opportunity W911KB-21-1-0006, 2021

This funding opportunity aims to obtain technical support and assistance to the Army National Guard (ARNG) to monitor and evaluate environmental cleanup actions at various contaminated ARNG installations within 54 states and territories. These tasks do not involve investigation/remediation of environmental contaminants; instead, the support services include environmental cleanup instruction; technical review of environmental documents; data analysis of work performed; management of environmental data; development of environmental cleanup program sites; and development of executive summaries. The Army Environmental Strategic Cleanup Plan requires all cleanup program sites to maintain and update programming and planning data as a means to document environmental liabilities and funding requirements. Award of a single Cooperative Agreement is anticipated for the duration of one 12-month base year and two option years under an estimated ceiling of \$3,305,106. Applications are due by June 28, 2021. <https://www.grants.gov/web/grants/view-opportunity.html?opnId=333864>

LEAD HAZARD REDUCTION GRANT PROGRAM

Department of Housing and Urban Development, Funding Opportunity FR-6500-N-13, 2021

The purpose of the Lead-Based Paint Hazard Reduction (LHR) grant program is to maximize the number of children under the age of six years that can be protected from lead poisoning by assisting states, cities, counties/parishes, Native American Tribes, or other units of local government in undertaking comprehensive programs to identify and control lead-based paint hazards in eligible privately-owned target housing. About 80 awards ranging from \$1M to \$5M are anticipated out of total estimated program funding of \$356,841,000. The closing date for applications is July 12, 2021. <https://www.grants.gov/web/grants/view-opportunity.html?opnId=333864>

Cleanup News

LESSONS LEARNED AND THE EVOLUTION OF HIGH-DENSITY QUANTITATIVE CHARACTERIZATION AND SURGICAL HIGH-PRESSURE IN-SITU INJECTION

Brab, B. | NEIWPCC Webinar, 15 October, virtual, 2020

Presentation uses site-specific data and examples to illustrate the importance of high-density quantitative characterization in implementing high-pressure injection for site remediation. For a recording of the webinar, see time 1:09-1:44: <https://www.youtube.com/watch?v=cl8R2K0Ae>

See slides 73-106: http://neiwpcc.org/wp-content/uploads/2020/10/NEIWPCC_UJEST-Webinar_10.14.20.pdf

INVESTIGATION OF MICROPOLLUTANTS REMOVAL FROM LANDFILL LEACHATE IN A FULL-SCALE ADVANCED TREATMENT PLANT IN ISTANBUL CITY, TURKEY

Argun, M.E., M. Akkus, and H. Ates. | Science of The Total Environment 748:141423(2020)

The removal efficiencies and the fates of micropollutants were determined in a full-scale leachate treatment plant (LTP) that includes an equalization pond, bioreactor, ultrafiltration, and nanofiltration. The removal efficiencies of chemical oxygen demand, NH₃, suspended solids, and electrical conductivity values of the landfill leachate in the LTP were 98%, 99%, 95%, and 51%, respectively. The most frequently and abundantly detected micropollutants in the LTP were heavy metals, VOCs, alkylphenols, and phthalates, and their overall removal efficiencies ranged from ~11% to 100%. Although the main removal mechanism of VOCs in the aerobic treatment is volatilization, the molecular weight cutoff restriction of UF membrane has caused negative removal efficiencies for some VOCs. The biological treatment unit was effective at removing PAHs (92%) and alkylphenols (87%). It was inferred that NO₃ accumulation in the anoxic reactor and high hydraulic and sludge retention times in aerobic reactor provide higher biodegradation and volatilization efficiencies than in the literature. Membrane processes more effectively removed alkylphenols (60-80%) and pesticides (59-74%). Removal efficiencies for Cu, Ni, and Cr, the dominant heavy metals, were 92, 91, and 51%, respectively. The main removal mechanism is thought to be coprecipitation of suspended solids by microbial biopolymers, bioreactor, and colloid separation during membrane filtration. The LTP was deemed effective at removing both conventional pollutants and micropollutants.

EX SITU SMOLDERING COMBUSTION (STARX): TREATMENT OF CONTAMINATED SOILS AT THE PORT LANDS FLOOD PROTECTION AND ENABLING INFRASTRUCTURE (PLFPEI) PROJECT

Lefl, D. | Smart Remediation, 4 February, virtual, 25 slides, 2021

In 2020, a contract was awarded to treat a minimum of 75,000 m³ of hydrocarbon contaminated soils via the largest STARX (ex situ thermal treatment by smoldering combustion) treatment plant constructed to date. The plant consists of four HP-250 Base Systems with a treatment capacity of approximately 1000 m³ per week and is slated to begin treating soil in January 2021. The presentation focus on STARX plant design, construction, and commissioning. The operational principles and procedures that will be used during the active operation portion of the project are reviewed. In addition, available operational data that illustrate the effectiveness of the STARX technology for treating hydrocarbon-impacted soils at the site are presented. <https://27a6n8m15h1v23m1335vxc-wenqine-netdna-scl.com/wp-content/uploads/2021/01/S0A87-Remediation-Virtual-Session-2-Feb-11-2021-Dave-L.pdf>

THE EFFECTS OF HYDRAULIC/PNEUMATIC FRACTURING-ENHANCED REMEDIATION (FRAC-IN) AT A SITE CONTAMINATED BY CHLORINATED ETHENES: A CASE STUDY

Lhotsky, O., J. Kukacka, J. Slinsky, K. Markova, J. Nemecek, V. Krnyti, and T. Cajthani. | Journal of Hazardous Materials 417:128116(2021)

Direct-push pneumatic fracturing combined with the hydraulic delivery of a suspension of milled iron, sulfidated nZVI, and sand in guar gum solution was pilot tested in low-permeability, heterogeneous geology contaminated with PCE (present partially in the free phase in the unsaturated zone). A whey solution was subsequently injected into the fractures as a carbon source for bacteria. Long-term groundwater monitoring indicated that abiotic reduction of PCE and TCE was the dominant remediation process for several months after the injections. A complex microbial consortium developed that could effectively dechlorinate chlorinated ethenes (ClE). The average chlorine number in the groundwater decreased from 3.65 to 1.38 within 2.5 years after the injections, while the average ClE concentration increased from 13.5 to 31.5 mg/L due to substantial acceleration of the ClE mass transfer to the groundwater caused by the treatment.

FIELD, LABORATORY AND MODELING EVIDENCE FOR STRONG ATTENUATION OF A CR(VI) PLUME IN A MUDSTONE AQUIFER DUE TO MATRIX DIFFUSION AND REACTION PROCESSES

Chapman, S., B. Parkes, T. Al, R. Wilkin, D. Cutt, K. Mishkin, and S. Nelson. | Soil Systems 5(18)(2021)

Both conventional and high-resolution field and laboratory methods were used to investigate processes that attenuate a Cr(VI) plume in sedimentary bedrock. Cr(VI) concentrations in the plume at a former industrial facility declined by more than three orders of magnitude over 900 m downgradient. Internal plume concentrations generally are stable or declining due to diffusive and reactive transport in the low-permeability matrix as fluxes from the source dissipate due to natural depletion and active remediation. The flow attenuation is attributed to diffusion from mobile groundwater in fractures to immobile porewater in the rock matrix and reactions causing transformation of aqueous Cr(VI) to low-solubility Cr(III) precipitates. Field characterization data for the fracture network and matrix properties were used to inform 2-D numerical model simulations that quantify attenuation due to diffusion and reaction processes. The field, laboratory, and modeling evidence demonstrate effects of matrix diffusion and reaction processes causing strong attenuation of a Cr(VI) plume in a sedimentary bedrock aquifer. <https://www.mdpi.com/2574-8769/5/1/18/pdf>

Demonstrations / Feasibility Studies

PILOT-SCALE FIELD INVESTIGATION OF EX SITU SOLIDIFICATION/STABILIZATION OF SOILS WITH INORGANIC CONTAMINANTS USING TWO NOVEL BINDERS

Feng, Y.-S., Y.-J. Du, W.-Y. Xia, and K.R. Reddy. | Acta Geotechnica 15:1467-1480(2020)

A pilot-scale field test was conducted to evaluate the performance of GM, a byproduct-based binder, and KMP, a phosphate-based binder, in stabilizing soil contaminated with Zn and Cl⁻ at an abandoned industrial plating plant site. The field soil was stabilized and cured for 1, 3, 7, and 28 days and tested for dry density, dynamic cone penetration, soil pH, and leachability. Results indicated that the strength of both the GM- and KMP-stabilized soils after 28-day curing improved significantly, while the leached Zn and Cl⁻ concentrations were below the corresponding remediation limits. In general, the KMP-stabilized soil demonstrated superior performance in terms of dry density, unconfined compressive strength, average dynamic cone penetration resistance, lower dynamic cone penetrometer index in the early curing stage (7 days), and lower leached Zn concentration under all curing times. In contrast, GM-stabilized soil exhibited superior immobilization of Cl⁻ in the contaminated soil regardless of the curing time. The results suggest that GM and KMP are promising binders for treating Zn- and Cl⁻-contaminated soil at plating and other industrial sites with similar contaminants.

USE OF A NOVEL INTEGRATED PASSIVE FLUX SAMPLER TO MONITOR THE SPREADING OF SOLUTES IN GROUNDWATER

Inspiration Bulletin, CL:AIRe (Contaminated Land: Applications in Real Environments), London, UK, IB 1, 6 pp, 2020

The iFLUX technology was demonstrated in 2019 at an urban study site contaminated with petroleum hydrocarbons and chlorinated solvents. The field demonstration focused primarily on PCE, TCE, cis- and trans-1,2-DCE, and VC. The iFLUX passive sampler successfully characterized mass flux from the source zone plume, which had undergone remediation in 2018 and was being monitored at the time of the demonstration. Since the first measurement of groundwater and mass flux at the site was conducted during the demonstration, conclusions about the evolution of contaminant concentrations in the source zones and the plume could not be reached. The action plan for the flux measurements includes a second round of sampling to be conducted within three years, as well as (1) monitoring active remediation and decreasing flux 3, 5, and 10 years after remediation and (2) monitoring plume and stable end concentration in 20, 30 and 30 years after remediation. <https://www.eclaire.eu/en/intermediate/photodownload/categorie/68-inspiration-bulletin-2020/download/72-7011-use-of-a-novel-integrated-passive-flux-sampler-to-monitor-the-spreading-of-solutes-in-groundwater-2020>

THE EFFECTS OF FAULT-ZONE CEMENTATION ON GROUNDWATER FLOW AT THE FIELD SCALE

Sproule, T.G., G.A. Spinelli, J.L. Wilson, M.D. Fort, P.S. Mozley, and J. Clarico. | Groundwater 59(3):396-409(2021)

A series of aquifer pumping tests were conducted to study the hydrogeologic effects of fault zone cementation in wells near the Loma Blanca fault in the Rio Grande Rift. In the southern half of the study area, the fault zone is cemented by calcite; the cemented zone is 2.8-m wide. In the center of the study area, the cemented fault zone is truncated at a butress unconformity that laterally separates hydrostratigraphic units with a ~40X difference in permeability. The fault zone north of the unconformity is not cemented. Constant rate pumping tests indicated that cemented areas of the fault act as a barrier to groundwater flow. This demonstrated that a fault with no clay in its core and similar sediment on both sides can be a barrier to groundwater flow, though most conceptual models for the hydrogeology of faults would predict otherwise. Additionally, the lateral permeability heterogeneity across the unconformity is another influence on the local flow field and acts as either a no-flow boundary or a constant head boundary, depending on pumping location.

RELIABILITY AND EFFICIENCY OF POLLUTANT REMOVAL IN FOUR-STAGE CONSTRUCTED WETLAND OF SSVF-SSHF-SSHF-SSVF TYPE

Gzinska-Gorna, M., K. Jozwiakowski, and M. Marzec. | Water 12:3153(2020)

Pollutant removal efficiency and reliability of a four-stage hybrid constructed wetland were evaluated for three years. Sampling was conducted each winter, spring, summer, and autumn. Grab samples of wastewater collected from different stages of treatment were tested for total suspended solids (TSS), biochemical oxygen demand (BOD₅), chemical oxygen demand (COD), total nitrogen (TN), and total phosphorus (TP). The wetland was found to have high removal efficiency of suspended solids and organics, with minimal seasonal variability. The three-year average TSS removal efficiency was approximately 92.7%. The elimination effectiveness of organic compounds was also high throughout the study period at 96.6% for BOD₅ and 95% for COD. The effluent from the four-stage system had significantly lower contents of TN and TP compared to the wastewater discharged from the first two beds of this facility. <https://www.mdpi.com/2073-4447/12/11/3153/pdf>

COMPARATIVE FIELD STUDY ON BIOASSAY RESPONSES AND MICROPOLLUTANT UPTAKE OF POCIS, SPEEDISK AND SORBICELL POLAR PASSIVE SAMPLERS

Nguyen, M.T., M.L. De Baat, R. Van Der Oost, W. Van Den Berg, and P. De Voogt. | Environmental Toxicology and Pharmacology 82:103549(2021)

This study aimed to identify the polar passive sampling (PS) device best suited for effect-based monitoring strategies. Speedisk, SorbiCell, and POCIS polar PS devices were simultaneously deployed at five sites. Chemical analyses of 108 moderately polar compounds revealed that the highest number of compounds were detected in POCIS extracts, followed by Speedisk. SorbiCell samplers accumulated the lowest numbers and concentrations of compounds and were not investigated further. Bioassay responses were compared in extracts from POCIS and Speedisk devices deployed at eight sites during a follow-up study. The passive sampler extracts were subjected to bioassays for non-specific toxicity, endocrine disruption, and antibiotic activities. More frequent and higher responses were induced by POCIS extracts, leading to more exceedances of effect-based trigger values for environmental risks. Performance data suggested that POCIS was better suited as a PS device than Speedisk for targeting polar compounds for semi-quantitative effect-based water quality monitoring.

Research

ASSESSMENT OF THE LONG-TERM LEACHING CHARACTERISTICS OF CEMENT-SLAG STABILIZED/SOLIDIFIED CONTAMINATED SEDIMENT

Zhang, W.-L., L.-Y. Zhao, Z.-J. Yuan, D.-Q. Li, and L. Morrison. Chemosphere 267:128926(2021)

The long-term leachability of Zn, Pb, Cd, and As in sediments mixed with ordinary Portland cement (OPC) and OPC/ground granulated blast furnace slag (GGBS) binders was investigated through tank leaching tests and kinetic leaching models. The leaching data revealed that both binder compositions have high immobilization capacity for the four contaminants, with their release being strongly pH-dependent and a complex function of curing time. The partial replacement of OPC by GGBS is more effective for addressing Zn and As at pH of 1, Pb at pH of 7, Zn and Pb at pH of 10. Predominant leaching mechanisms and leachability indices were determined using nonlinear regression analysis and kinetic leaching models. The first-order diffusion model was the most applicable model for describing the leaching characteristics of these metals. The leachability indices suggest that the cement-slag solidification/stabilization sediment can be regarded as an environmentally sustainable material with potential beneficial uses in construction.

MECHANISMS THAT INFLUENCE THE INTERACTIONS BETWEEN REMEDIATION AGENT INJECTION AND CONTAMINATION PLUME VARIATION

Xu, Q., Y. Wang, X. Song, and J. Chen. J. Journal of Contaminant Hydrology 231:103631(2020)

A 2-D sandbox experiment was conducted to simulate and monitor the mixing of a potassium permanganate (purple solution) with a PCE (dyed green) plume and monitor plume expansion over time. Migration distance (d_M), migration area (A_M), initial area ratio (K_i), spreading speed difference, area ratio, and migration distance ratio were proposed to analyze the influence of injection pressure, particle size, and viscosity change on potassium permanganate mixing and PCE plume expansion over time. The six parameters were found to effectively characterize the mixing of the remediation agent and the expansion of the contamination plume, where d_M , A_M , and K_i characterize the expansion, and the other three parameters characterize the mixing. The TOPSIS method identified optimal injection conditions and showed that under these conditions, mixing was enhanced without increasing plume expansion.

GENTLE REMEDIATION OPTIONS FOR SOIL WITH MIXED CHROMIUM (VI) AND LINDANE POLLUTION: BIOSTIMULATION, BIOAUGMENTATION, PHYTOREMEDIATION AND VERMIREMEDIATION

Lacalle, R.G., J.D. Aparicio, U. Artetxe, E. Urionabarrenetxea, M.A. Polti, M. Soto, C. Garbisu, and J.M. Becerril. J. Heliyon 6(8):e04550(2020)

A greenhouse experiment was performed using organically- versus non-amended mixed polluted soils to assess the individual and combined effectiveness of gentle remediation options to recover the health of a soil artificially polluted with Cr(VI) and lindane. All soils received the following treatments: no treatment, bioaugmentation with an actinobacteria consortium, vermiremediation with *Eisenia fetida*, phytoremediation with *Brassica napus*, bioaugmentation+vermiremediation, bioaugmentation+phytoremediation, and bioaugmentation+vermiremediation+phytoremediation. Soil health recovery was determined based on Cr(VI) and lindane concentrations, microbial properties, and toxicity bioassays with plants and worms. While Cr(VI) pollution caused high toxicity, organic amendment alleviated toxicity by decreasing Cr(VI) concentrations, the actinobacteria consortium effectively removed both Cr(VI) and lindane, and *B. napus* and *E. fetida* had a positive effect on pollutant removal and improved microbial properties. The combination of the organic amendment, *B. napus*, *E. fetida*, and the actinobacteria consortium was the most effective strategy.

<https://reader.elsevier.com/reader/sd/pii/S24658440201313943?token=6DAFC75269A942766691548B0675D92F7B786C14DC8C8F84277D70B8C95E70BEF6E3AE3C1181CA2478F1AA708000Region=us-east-1&originCreation=20210513>

MACHINE LEARNING PATTERN RECOGNITION FOR FORENSIC ANALYSIS OF DETECTED PER- AND POLYFLUOROALKYL SUBSTANCES IN ENVIRONMENTAL SAMPLES

Kibbey, T., R. Jabrzemski, and D. O'Carroll. SERDP Project ER-2015-212 pp. 2020

This proof of concept project explored the use of modern machine learning algorithms for forensic source allocation of detected PFAS in environmental samples. An extensive dataset from a range of worldwide PFAS concentration data sources was compiled. A portion of the dataset was used to train supervised machine learning classifiers to recognize patterns that can distinguish between PFAS from aqueous film-forming foam (AFFF) and non-AFFF sources. Results showed that several very different supervised learning classifiers work well for this purpose and can identify AFFF in samples even in difficult-to-recognize categories of samples. The results show that supervised machine learning has significant promise to distinguish between PFAS from AFFF and non-AFFF sources. <https://www.serdp-estcp.org/content/download/5319/523566/file/ER-20-1205%20Final%20Report.pdf>

ASSESSING BIOTA ACCUMULATION DUE TO CONTAMINATION OF SEDIMENTS BY STORM WATER HEAVY METALS

Drygiannaki, I., M. Bejar, D.D. Reible, J.A. Dawson, B. Rao, N.T. Hayman, G.H. Rosen, M.A. Colvin. J. Environmental Toxicology and Chemistry 39(12):2475-2484(2020)

A study was conducted on the bioaccumulation of Zn, Ni, Cu, Cd, Hg, Pb, and As in *Macoma nasuta* in surficial sediments before and after stormwater inputs from Paleta Creek, California, during wet seasons in 2015-2016 and 2016-2017. Bioaccumulation was compared with bulk sediment concentrations and porewater concentrations measured by diffusion gradient in thin-film devices. Biota accumulation and porewater concentrations were significantly reduced in samples collected after storm seasons compared with before despite bulk sediment concentrations remaining the same or increasing. This was apparently the result of the deposition of stormwater contaminants in low bioavailable forms. Contaminant bioaccumulation showed a significant positive correlation with porewater concentrations and weak or no correlations with bulk sediment concentration. Observed bulk sediment recontamination due to stormwater should not be assumed to lead directly to greater biota accumulation without bioavailability assessment.

INTENSIFICATION OF EX SITU BIOREMEDIATION OF SOILS POLLUTED WITH USED LUBRICANT OILS: A COMPARISON OF BIOSTIMULATION AND BIOAUGMENTATION WITH A SPECIAL FOCUS ON THE TYPE AND SIZE OF THE INOCULUM

Bodor, A., P. Petrovski, A.E. Kis, G.E. Vincke, K. Lacz, N. Bounedjoum, A. Szilagyi, B. Szalontai, G. Feigl, K.L. Kovacs, G. Rakhely, and K. Perel. International Journal of Environmental Research and Public Health 17:4106(2020)

Soil microcosm experiments were conducted to model the ex situ bioremediation of an area polluted with used lubricant oils (ULOs). The efficacy of TPH removal was determined through biostimulation and application of various inoculation levels of bioaugmentation. ULO-contaminated soil microcosms were monitored for microbial respiration, colony-forming units (CFUs), and TPH bioconversion. Biostimulation with inorganic nutrients removed 22% of ULOs after 40 days. Bioaugmentation with two hydrocarbon degrader strains at 10⁷ CFUs/g soil reduced initial TPH concentration by 24% and 29%, respectively. Applying 10⁹ CFUs/g soil led to 41% and 32% bioconversion, respectively. After 20 days, all augmented CFUs decreased to the same level measured in the biostimulated cases, substantiating the challenge for the newly introduced hydrocarbon-degrading strains to cope with environmental stressors. Results highlight that an increased number of degrader cells does not always correlate with enhanced TPH bioconversion. They also indicate that biostimulation might be an economical solution to promote ULO biodegradation in long-term contaminated soils. <https://www.mdpi.com/1660-4601/17/11/4106/pdf>

IN SITU SOIL FLUSHING TO REMEDIATE CONTAMINATED SOIL WITH PFOS-AN INNOVATIVE SOLUTION FOR EMERGING ENVIRONMENTAL ISSUE

Senevirathna, S.T.M.L.D., R. Mahiroosta, M. Li, and K. Krishnappa. Chemosphere 262:127606(2021)

An in situ soil flushing technique was assessed for remediating PFOS-contaminated soil. The proposed complete treatment process included several operation units such as solvent flushing, groundwater pumping, solvent recovery, and water treatment. More than 98% PFOS removal was attained by flushing with five-bed volumes of 50% ethanol. The study also investigated 13 commercially available filter materials and identified PFA694E, K6362, MP 62, Amberlite IRA 67, and Dowexoptopore V493 as suitable to eliminate PFOS with competitive PFOS adsorption characteristics. A contaminated site with favorable characteristics to implement the suggested method was identified in Australia and is described.

General News

NEW TECHNIQUE SHEDS LIGHT ON PFAS IN COASTAL WATERSHEDS

National Institute of Environmental Health Sciences, Superfund Research Program, May 2021

This two-page fact sheet describes a new analytical workflow to identify and characterize previously undetected PFAS compounds in contaminated watersheds. The research team designed an approach to distinguish the signature of PFAS from different sources, such as aqueous film-forming foams (AFFF) in six coastal watersheds on Cape Cod, Massachusetts. While AFFF is known to be a major source of contamination, PFAS from other sources are also present within watersheds, including septic systems, wastewater, agriculture, and atmospheric deposition, making it difficult to isolate their origins. https://tools.niehs.nih.gov/scr/1/ResearchBriefs/pdfs/ISRP_ResearchBrief_317_508.pdf

DOD VAPOR INTRUSION HANDBOOK FACT SHEET UPDATE - VAPOR INTRUSION PREFERENTIAL PATHWAYS

DoD Tri-Service Environmental Risk Assessment Workgroup, Update No. 010, 12 pp, 2020

This fact sheet relates to Sections 2, 3, 5, and Appendix D of the DoD Vapor Intrusion (VI) Handbook. This fact sheet includes 1) an updated conceptual model including scenarios for sites with higher and lower risk for VIPPs and 2) new methods for sampling preferential pathways. Unless a specific citation is provided, the information in this fact sheet is based on the findings from ESTCP Project ER-201505 on Sewers and Utility Tunnels as Preferential Pathways for Volatile Organic Compound Migration into Buildings. <https://www.dodm.mil/in/vaporintrusion/inassigned/vippp-fact-sheet/508> Final%20V1%20Preferential%20Pathway%20Fact%20Sheet%20September%202020.pdf
DoD Vapor Intrusion Handbook <https://www.dodm.mil/in/vaporintrusion/inassigned/dod-vapor-intrusion-hbk>
More information on ESTCP Project ER-201505: <https://www.serdp-estcp.org/ProgramAreas/EnvironmentalRestoration/Contaminated-Groundwater/Emerging-Issues/ER-201505/ER-201505>

NANOREMEDIATION TECHNOLOGIES FOR SUSTAINABLE REMEDIATION OF CONTAMINATED ENVIRONMENTS: RECENT ADVANCES AND CHALLENGES

Ganie, A.S., S. Bano, N. Khan, S. Sultana, Z. Rehman, M.M. Rahman, S. Sabir, F. Coulon, and M.Z. Khan. J. Chemosphere 275:130065(2021)

This review article provides a critical outlook of recent advances and future perspectives of nanoremediation technologies that can be applied for environmental decontamination. Sustainability assessments of nanoremediation technologies also are reconsidered for tackling legacy contamination with a special focus on health and environmental impacts. The review further outlines the ecological implications of nanotechnology and provides consensus recommendations on the use of nanotechnology for a better present and sustainable future.

ADVANCES IN UNDERSTANDING PFAS ECOLOGICAL RISKS

Kurz, M., and J. Suski. SERDP & ESTCP Webinar Series, Webinar #131, April 2021

This SERDP and ESTCP webinar focused to improve understanding of the ecological risks of PFAS. Specifically, investigators discussed the pathways and rates of PFAS uptake, bioaccumulation, and biomagnification within freshwater food webs and a tiered approach for assessing PFAS risk to threatened and endangered species. <https://www.serdp-estcp.org/Tools-and-Training/Webinar-Series/04-08-2021>

ECOSYSTEM SERVICES CONSIDERATION IN THE REMEDIATION PROCESS FOR CONTAMINATED SITES

Harwell, M.C., C. Jackson, M. Kravitz, K. Lynch, J. Tomasula, A. Neale, M. Mahoney, C. Pachon, K. Scheuermann, G. Grissom, and K. Parry. Journal of Environmental Management 285:112102(2021)

In 2009, EPA's Science Advisory Board made recommendations that advanced consideration of ecosystem services (ES) to enhance existing remedial and redevelopment processes. This article examines advancements in the decade since and provides a basic understanding of concepts and guidelines for considering ES at cleanup sites using a new, four-step transferable framework: (1) identify site-specific ES; (2) quantify relevant ES; (3) examine how cleanup activities affect ES; and (4) identify, select, and implement solutions.

TARGETING THE RIGHT PARAMETERS IN PAH REMEDIATION STUDIES

Davin, M., G. Colinet, and M.-L. Fauconnier. Environmental Pollution 278:116857(2021)

Three scientific trends that are leading current studies and management of PAH-contaminated soils and sediments are reviewed and discussed. This paper first discusses the choice of compounds that are being studied and targeted in the scientific literature, suggesting that the class of 15 EPA PAH compounds may no longer be sufficient to meet current environmental challenges. The paper then discusses the choice of experimental material in remediation studies. Biomimetic measures show the lack of PAH remediation trials based on co-contaminated or aged-contaminated material. Finally, the paper suggests the systematic use of the recently validated ISO/TS 16751 bioavailability measurement protocol should be implemented as a tool to improve remediation processes and management strategies.

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