Technology Innovation News Survey

Entries for December 1-15, 2021

Market/Commercialization Information

OFFICE OF LAND AND EMERGENCY MANAGEMENT (OLEM) CONSOLIDATED MISSION SUPPORT (SNOTE)
U.S. Environmental Protection Agency, Headquarters Acquisition Division, Washington, DC
Contract Opportunities on SAM.gov, Solicitation 68HERH21R0024, 2022

EPA is seeking interested parties to thoroughly review sections of EPA's Office of Land and Emergency Management (OLEM) Consolidated Mission Support Draft Solicitation and provide comments, questions, suggested changes, and feedback by Friday, January 21, 2022, at 5:00 PM EST. EPA does not anticipate posting responses to any comments, questions, suggested changes, and/or feedback received. However, all input will be considered in developing the Final Solicitation. Additionally, the Draft Solicitation is subject to change in the development of the Final Solicitation as a result of the EPA's consideration of the input received from interested parties in response to the Draft Solicitation. https://sam.gov/opp/1766776694104251aa531f8da241bfb0/view

ENVIRONMENTAL REMEDIATION SERVICES FOR THE TEMPORARY TREATMENT OF GROUNDWATER AND EXCAVATION AND DISPOSAL OF SOILS CONTAMINATED WITH VOLATILE ORGANICS AT THE DURHAM MANUFACTURING COMPANY, DURHAM, CONNECTICUT (SRCSGT)
U.S. Army Corps of Engineers, North Atlantic Division, Concord, MA
Contract Opportunities on SAM.gov, Solicitation W912WJ22X0009, 2022

This is a sources sought notice for market research purposes only under NAICS code 562910. The U.S. Army Corps of Engineers, New England District desires to identify contractors capable of providing Environmental Remediation Services for the temporary treatment of groundwater and excavation and disposal of soils contaminated with volatile organics at the Durham Manufacturing Company in Durham, Connecticut. The value of the construction project is expected to be in the $5M - $10M range. A best-value solicitation is planned for late June 2022, and remediation fieldwork is expected to begin early 2023 and be completed by the end of that calendar year. Contract Line items (CLINs) will likely be a mix of fixed-price line items and clearly defined, separable cost-reimbursable line items for utility work, groundwater treatment, foundation support/restoration, and soil removal. No solicitation is currently available. All interested offerors will have the opportunity to respond to the solicitation announcement at a later time. Capability statements are due by 5:00 PM EST on February 7, 2021.
https://sam.gov/opp/36e761483f654f75a60e16bb726f19ea/view

INFRASTRUCTURE INVESTMENT AND JOBS ACT - ENVIRONMENTAL AE MATOC (PRESOL)
U.S. Army Corps of Engineers, Louisville District, Lousiville, KY
Contract Opportunities on SAM.gov, Solicitation W912QR22R0031, 2022

When the solicitation is released, it will be competed as a full and open competition under NAICS code 541330. The U.S. Corps of Engineers seeks firms capable of performing work on a wide variety of Hazardous, Toxic, and Radioactive Waste (HTRW) sites in addition to other environmental sites in a manner that complies with federal, state, and local laws and regulations and within timeframes required. Specific needs will be determined based upon project requirements and as described in each task order. A-E services required under this contract include, but are not limited to: performing environmental services for environmental projects conducted in accordance with federal laws and regulations, including the RCRA, Comprehensive Environmental Response, CERCLA, Superfund Amendments and Reauthorization Act, Toxic Substances Control Act, Clean Water Act, National Environmental Policy Act, and other federal programs; and performing environmental services for environmental projects conducted in accordance with state and local environmental laws and regulations. Examples of environmental services to be conducted can be found at https://sam.gov/opp/bcf8cffdec4a4867847703d7f6f691ab/view . For on-site investigations, firms must provide personnel with current health and safety training, as required by the Occupational Safety and Health Administration, and adhere to all USACE requirements for health and safety. The estimated award date is May 2022. Up to five firms will be selected for the MATOC. The maximum cumulative MATOC value is $45,000,000. The cumulative MATOC value will be shared by all selected firms.
https://sam.gov/opp/bcf8cffdec4a4867847703d7f6f691ab/view

COLUMBIA RIVER BASIN RESTORATION FUNDING ASSISTANCE PROGRAM - MIDDLE AND UPPER COLUMBIA RIVER BASIN
EPA Region 10, Funding Opportunity EPA-R10-OW-CRBRP-2022-02, 2021

EPA Region 10 is issuing a Request for Applications (RFA) from eligible entities to improve water quality in the Middle and Upper Columbia River Basin through specific actions to reduce toxics, increase monitoring, and/or increase public education and outreach. The Columbia River Basin Restoration Program will assist tribal, state, and local governments; non-governmental entities, and others as they implement the Columbia River Basin Toxics Reduction Action Plan and the Lower Columbia River Estuary Plan - Comprehensive Conservation and Management Plan and conduct activities to support EPA national goals for the Columbia River Basin. 2 Eligible projects must address at least one of the following project categories: eliminating or reducing pollution; cleaning up contaminated sites; improving water quality; monitoring to evaluate trends; reducing runoff; protecting habitat; or promoting citizen engagement or knowledge. Priority for funding will be given to projects which are consistent with federal FY21/22 funding priorities as described in the RFA. Eligible entities include state governments, tribal governments, regional water pollution control agencies and entities, local government entities, non-governmental entities, or soil and water conservation districts. The work must be for the purpose of environmental protection and restoration activities within the Columbia River Basin and may include programs, projects, and studies. EPA anticipates awarding about 15 cooperative agreements, ranging from $75,000 to $350,000 for the Middle and Upper Columbia River Basin portion of the Basin under this RFA, subject to the availability of funds, the quality of applications received and other applicable considerations. Applicants may apply under both this RFA and the Lower Columbia River Estuary RFA, which is issued separately, for basin-wide projects. Offers are due by 11:59 PM ET on February 8, 2022. https://www.grants.gov/web/grants/view-opportunity.html?oppId=336446

Cleanup News

CONTROL OF OFF SITE MIGRATION IN LOW PERMEABILITY SOIL WITH AN EDUCTOR SYSTEM
Galbraith F. and C. Nan. I REMTECH 2021: The Remediation Technologies Symposium, Banff, AB, Canada, 13-15 October, abstract only, 2021

An eductor extraction system was designed and constructed to mitigate downgradient contaminant migration and remediate soil vapor and groundwater at a commercial site. Prior site investigations identified petroleum hydrocarbon and chlorinated solvent contamination in soil vapor, soil, and groundwater that migrated downgradient and offsite. The project minimized downgradient contaminant migration by extracting groundwater and vapors from 17 closely spaced wells installed along the downgradient edge of the site. Monitoring results identified reductions in concentrations and degradation of chlorinated solvents and petroleum hydrocarbons in the zone of influence of the system. The system operated with high uptime, low maintenance, and low power consumption. Key project challenges included conducting remediation in an urban setting, active remediation in tight soils, and regulatory oversight issues.

APPLICATIONS OF HYPORHEIC ZONE SAMPLING FOR ASSESSING VOC PLUME ENGINEERED REMEDIATION AND NATURAL ATTENUATION EFFECTIVENESS
Williams, J.B. and E.A. Shull.
WM2020: Annual Waste Management Conference, 8-12 March, Phoenix, AZ, 20 slides, 2020

Intensive sampling conducted at the Savannah River Site (SRS) Chemical, Metals, and Pesticides (CMP) Pits VOC plume fringe from 2005-2018 documented PCE natural attenuation and in situ thermal treatment (ISTT) effectiveness. The sampling utilized ambient hole-water grab samples, passive diffusion bags (PDB), and hole-core sediment samples to confirm station to station spatial and temporal trends. VOC hot spot detections were confirmed from groundwater and soil core samples. VOC pathways through the hyporheic zone were assessed at hole-installation using sequential soil samples from augered cores and grab samples of hole-bottom water. Longer-term composite water samples were collected from PDBs deployed for a minimum two-week equilibration period. Soil samples were collected from the 15 and 65 cm core levels at six stations in December 2017 and June 2018. Additional core depths of 40 and 85 cm were sampled in June 2018 at the highest VOC station. Wide differences were observed between stations. A natural attenuation index was used to produce quicker, more cost-effective decision-making for locating compound-specific isotope ratio analysis and microbial sampling efforts.
Slides:
https://s3.amazonaws.com/amz.xcdsystem.com/A464D2CF-E476-F46B-841E415B85C431CC_abstract_File500/PresentationPDF_20414_0327104631.pdf
Paper: https://s3.amazonaws.com/amz.xcdsystem.com/A464D2CF-E476-F46B-841E415B85C431CC_abstract_File498/FinalPaperPDF_20414_0327104927.pdf

VIBRACORE SEDIMENT ACQUISITION MONITORING (V-SAM) FOR REMEDIATION DREDGING DESIGN AT THE PORTLAND HARBOR SUPERFUND SITE
Fuglevand, P., C. Lamb, D. Browning, and B.Jaworski.
Proceedings of the Western Dredging Association Dredging Summit & Expo. 15-17 June, virtual, 2021

Selected results and lessons learned are presented from advancing more than 50 sediment cores at the Portland Harbor Superfund Site using a recently developed Vibracore sediment acquisition monitoring (V-SAM) system. The coring program was conducted to estimate the depth of contamination below mudline (bml) for remediation dredging design. V-SAM provides incremental measurements of the core tube's penetration depth into the sediment bed and the corresponding incremental measurements of the sediment collected inside the tube. By providing a means to estimate positions of sediment samples in the core tube with respect to in-situ sample depths bml, V-SAM provides improved estimates of DOC for remediation dredging design. *See* ***pages 68-79:***
https://www.westerndredging.org/phocadownload/2021_Virtual/Proceedings/2021%20Dredging%20Summit%20and%20Expo%20Proceedings.pdf

VOLUNTARY EARLY REMOVAL OF SEDIMENTS COMPLETED AT FORMER GREEN BAY MGP

Goetz, S.L., R. Paulson, J.M. Hagen, C. Simmons, and Eric Hritsuk.
Proceedings of the Western Dredging Association Dredging Summit & Expo. 15-17 June, virtual, 2021

The Wisconsin Public Service Corp former manufactured gas plant (MGP) Superfund Site enrolled in EPA's Superfund Alternative Site (SAS) program completed a voluntary early removal action of MGP-affected sediment in 2018-2019. MGP-affected sediment was co-mingled with PCB-affected sediment being remediated as part of the Lower Fox River PCB Project. The 2017 remedial investigation defined the South Focus Area (SFA) and North Focus Area at the confluence of the Lower Fox and East Rivers. MGP-affected sediment included visual observations of DNAPL and elevated chemical concentrations. DNAPL mobility testing was performed to inform the assessment of potential removal actions and fate of residuals. PCB material and MGP material were generally co-located in the soft sediment, while only DNAPL was present in the underlying clay fractures. Leveraging the ongoing PCB remediation project equipment and infrastructure led to a more cost-effective and accelerated schedule to address the MGP-affected sediment voluntarily. The 2018 SFA removal action removed ~5,250 yd^3 (4,014 m^3) of commingled PAH and PCB-containing soft sediment. Excavated material was mixed with Calciment® or a Portland cement/Calciment blend and off-loaded for transportation to a local landfill, including ~4,000 tons (3,629 metric tons) clay and 2,740 tons (2,486 metric tons) shoreline soil. The final removal action was completed in 2019 with the removal of ~28,870 cubic yards (22,073 cubic meters) of commingled soft-sediment and clay. *See* ***pages 155-165:*** https://www.westerndredging.org/phocadownload/2021_Virtual/Proceedings/2021%20Dredging%20Summit%20and%20Expo%20Proceedings.pdf

Demonstrations / Feasibility Studies

FIELD-SCALE DEMONSTRATION OF PFAS LEACHABILITY FOLLOWING IN SITU SOIL STABILIZATION

McDonough, J.T., R.H. Anderson, J.R. Lang, D. Liles, K. Matteson, and T. Olechiw.
ACS Omega 7(1):419-429(2022)

A field-scale validation compared the efficacy of commercially available stabilization amendments to mitigate PFAS leaching from aqueous film-forming foam (AFFF)-impacted source zones. The work included bench-scale testing to evaluate multiple amendments and application concentrations to mitigate PFAS leachability, followed by field-scale soil mixing. FLUORO-SORB Adsorbent (FS) and RemBind (RB) were selected for field-scale evaluation. Five ~28 m3 test pits (~3m x 3m x 3m) were mixed using conventional construction equipment. One control test pit (Test Pit 1) included Portland cement (PC) only (5% dw). The other four test pits (Test Pits 2 through 5) compared 5 and 10% ratios (dw) of FS and RB (with PC). Five separate monitoring events included two to three sample cores collected from each test pit for EPA Method 1315 leaching analysis. After 1 year, a mass balance for each test pit compared the total PFAS soil mass before, during, and after leach testing. Bench-scale and field-scale data demonstrated a >99% decrease in total PFAS leachability (mass basis; >98% mole basis), confirmed by total oxidizable precursor assay results.

FIELD DEMONSTRATION OF COUPLING ION-EXCHANGE RESIN WITH ELECTROCHEMICAL OXIDATION FOR ENHANCED TREATMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) IN GROUNDWATER

Liang, S., R. Mora, Q. Huang, R. Casson, Y. Wang, S. Woodard, and H. Anderson.
Chemical Engineering Journal Advances 9:100216(2022)

A pilot-scale field demonstration evaluated remediation of aqueous film-forming foam (AFFF)-contaminated groundwater using a coupled regenerable ion exchange resin (IXR) and electrochemical oxidation (EO) treatment train. The pilot-scale IXR system incorporated a novel resin regeneration process that recovers and reuses the regenerant solutions. The IXR system removed PFAS from ~1,000,000 L (~260,000 gallons) of AFFF-contaminated groundwater; treated effluent was ND for PFOA and PFOS. The concentrated waste stream treated on-site by an EO system achieved 80-98% destruction of PFOA and PFOS. Results show the promise of coupling regenerable IXR with EO for cost-effective removal to concentrate and destroy PFAS in groundwater.

MAPPING AND MONITORING OF DNAPL SOURCE ZONES WITH COMBINED DIRECT CURRENT RESISTIVITY AND INDUCED POLARIZATION: A FIELD-SCALE NUMERICAL INVESTIGATION

Almpanis, A., J. Gerhard, and C. Power.
Water Resources Research 57(11)e2021WR031366(2021)

A field-scale study assessed combined direct current and induced polarization (DCIP) to characterize and monitor DNAPL source zones (SZs). A newly developed DNAPL-DCIP numerical model couples a 3D multiphase flow model (to simulate DNAPL release and remediation scenarios) with a 3D DCIP model (to calculate the corresponding resistivity and chargeability response). The sensitivity of the DCIP response to key DNAPL and soil properties was analyzed at a single subsurface location that matched previous theoretical and experimental observations. A field-scale simulation of DNAPL release and remediation was conducted, with simultaneous mapping by DCIP surveys. Results demonstrate that chargeability can enhance understanding of the lithological distribution that controls the variability in the DNAPL SZ, with time-lapse resistivity being used to monitor DNAPL mass changes during SZ remediation.

ESTABLISHING THE PREVALENCE AND RELATIVE RATES OF 1,4-DIOXANE BIODEGRADATION IN GROUNDWATER TO IMPROVE REMEDY EVALUATIONS

Adamson, D.T., J.T. Wilson, D.L. Freedman, A.A. Ramos-Garcia, C. Lebrond, and A. Danko.
Journal of Hazardous Materials [Published online 12 November 2021 prior to print]

Field, lab, and monitoring efforts were used to investigate natural attenuation (NA) processes for 1,4-dioxane at 10 sites. Multiple lines of evidence for 1,4-dioxane biodegradation were used to understand the prevalence of NA and evaluate convergence between lines of evidence. A ^{14}C-1,4-dioxane assay confirmed 1,4-dioxane biodegradation at 9 sites (median rate constant of 0.0105/yr across wells). Site-wide rate constants were established using a calibrated fate and transport model at 8 sites (median = 0.075/yr). The ^{14}C assay constants are likely more conservative, and variability in rates suggested that biodegradation at sites may be localized. Stable isotope fractionation observed at 7 sites served as another direct line of evidence of in situ biodegradation of 1,4-dioxane. This includes sites where indirect lines of evidence, including geochemical conditions or genetic biomarkers for degradation, would not necessarily have been supportive. Results highlight the importance of collecting multiple lines of evidence to document 1,4-dioxane NA.

Research

IN SITU ARSENIC IMMOBILISATION FOR COASTAL AQUIFERS USING STIMULATED IRON CYCLING: LAB-BASED VIABILITY ASSESSMENT

Barron. A., J. Sun, S. Passaretti, C. Sbarbati, M. Barbieri, N. Colombani, J. Jamieson, B.C. Bostick, Y. Zheng, M. Mastrocicco, M. Petitta, and H. Prommer.
Applied Geochemistry 136:105155(2022)

Sediment and groundwater from a severely polluted coastal aquifer were used to explore the efficiency of nitrate-Fe(II) treatments to mitigate dissolved As concentrations. In experiments, >99% of dissolved As was removed compared to unamended controls, and concentrations were maintained when lactate was added. Pre- and post-experimental characterization of Fe mineral phases suggested a >90% loss of amorphous Fe oxides in favor of increased crystalline, recalcitrant oxide, and sulfide phases. Magnetite formation did not occur via the nitrate-dependent oxidation of the amended Fe(II) as expected but may have formed by the Fe(II)-catalyzed transformation of pre-existing amorphous and crystalline Fe oxides. The extent of amorphous and crystalline Fe oxide transformation was limited by the exhaustion of dissolved Fe(II). Elevated phosphate concentrations lowered the treatment efficacy, indicating joint phosphate removal is necessary for maximum impact.

POTENTIAL HUMAN HEALTH HAZARD OF POST-HURRICANE HARVEY SEDIMENTS IN GALVESTON BAY AND HOUSTON SHIP CHANNEL: A CASE STUDY OF USING IN VITRO BIOACTIVITY DATA TO INFORM RISK MANAGEMENT DECISIONS

Chen, Z., S. Jang, J.M. Kaihatu, Y.H. Zhou, F.A. Wright, W.A Chiu and I. Rusyn.
International Journal of Environmental Research and Public Health 18(24):13378(2021)

The suitability of in vitro toxicity testing methods was investigated as a rapid way to identify areas of potential human health concern. Sediment samples (n = 46) from Galveston Bay and the Houston Ship Channel (GB/HSC) areas were collected after Hurricane Harvey. The hurricane led to a broad redistribution of chemically contaminated sediments, including sediment deposition onshore due to flooding. Samples were extracted with cyclohexane and dimethyl sulfoxide and screened in a compendium of human primary or induced pluripotent stem cell-derived cell lines from different tissues to test for concentration-dependent effects on various functional and cytotoxicity phenotypes (n = 34). Bioactivity data were used to map areas of potential concern, and the results compared to PAH concentration data in the same samples. Setting remediation goals based on reducing bioactivity is protective of both known risks associated with PAHs and unknown risks associated with bioactivity, but the converse was not true for remediation based on PAH risks alone. In vitro bioactivity can be a comprehensive indicator of potential hazards and is an example of a new approach method to inform risk management decisions on-site cleanup. *This article is* ***Open Access*** *at* https://www.mdpi.com/1660-4601/18/24/13378.

DEVELOPMENT OF TOXICITY REFERENCE VALUES (TRVS) FOR BIRDS EXPOSED TO PFOS, PFOA AND ASSOCIATED MIXTURES OF FLUORINATED COMPOUNDS

Simcik, M. and S.J. Bursian. SERDP Project ER-2624, 128 pp, 2021

A study assessed the acute toxicity of PFOS and PFOA, individually and in combination, and two aqueous film-forming foam (AFFF) formulations in Japanese quail (Coturnix japonica). The project determined the chronic toxicity of PFOS and one AFFF formulation and developed a TRV for Japanese quail. Acute studies involved feeding 10-day old quail feed dosed with 9 dietary treatments of PFOS, PFOA, PFOS + PFOA, 3M AFFF, and Ansul AFFF. In chronic studies, exposed juvenile quail were fed 6 dietary treatments of either PFOS or 3M AFFF -contaminated feed. Those quail were paired, and reproductive effects were observed. From acute exposure, average daily doses resulting in 50% mortality at day 5 were 38, 68, 55, and 130 mg PFOS, PFOA, PFOS + PFOA, and PFOS in 3M AFFF/kg body weight/d, respectively. Ansul AFFF did not result in any mortalities. Average dietary concentrations resulting in 50% mortality at day 5 were 351, 496, 398, and 467 mg PFOS, PFOA, PFOS + PFOA, and PFOS in 3M AFFF/kg/feed, respectively. From chronic exposure, PFOS or AFFF PFOS did not significantly

affect egg production but had a variable effect on hatchability and chick body weight. Chick survivability considered the critical effect, significantly decreased beginning at 8.7 mg PFOS and 11 mg AFFF PFOS/kg feed. The no observed adverse effect level for PFOS was 4.1 mg kg/feed (0.55 mg/kg body weight/d) and 5.0 mg AFFF PFOS kg feed-1 (0.66 mg/kg body weight/d) resulting in average TRVs of 0.25 mg/kg feed and 0.034 mg/kg body weight/d.
https://www.serdp-estcp.org/content/download/53928/529656/file/ER-2624%20Final%20Report.pdf

SEDIMENT REMEDIATION WITH NEW COMPOSITE SORBENT AMENDMENTS TO SEQUESTER PHOSPHORUS, ORGANIC CONTAMINANTS, AND METALS

Wikstrom, J., S. Bonaglia, R. Ramo, G. Renman, J. Walve, J. Hedberg, and J.S. Gunnarsson.
Environmental Science & Technology 55(17):11937-11947(2021)

A study tested injecting aluminum (Al) into sediments and thin-layer capping with Polonite (calcium-silicate), both with and without activated carbon (AC), to simultaneously sequester sediment phosphorus (P), hydrophobic organic contaminants (HOCs), and metals. Sediment cores were collected from a eutrophic and polluted brackish water bay in Sweden and incubated in the lab to measure sediment-to-water contaminant release and effects on biogeochemical processes. Diffusive gradients in thin-film passive samplers were used for metals and semi-permeable membrane devices for PCBs and PAHs. Al injection into anoxic sediments stopped the release of P and reduced the release of Cd (-97%) and zinc (Zn, -95%) but increased the sediment fluxes of PAH (+49%) compared to the untreated sediment. Polonite mixed with AC reduced the release of P (-70%), Cd (-67%), and Zn (-89%) but increased the release of methane (CH4). Adding AC to the Al or Polonite reduced the release of HOC by 40% in both treatments. Results demonstrate the potential of innovative remediation techniques using composite sorbent amendments and highlight the need to assess possible ecological side effects on, for example, sedimentary microbial processes.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8427744/pdf/es1c02308.pdf

A NOVEL, DIRECT-PUSH APPROACH FOR DETECTING SULFIDATED NANOPARTICULATE ZERO VALENT IRON (S-NZVI) IN SEDIMENTS USING REACTIVE AND NON-REACTIVE FLUOROPHORES

Reischer, M., A.G. Christensen, K. Weber, D.J. Tobler, and K. Dideriksen.
Journal of Contaminant Hydrology 243:103896(2021)

A new direct-push-based technique was developed that combines fluorescent and visible imaging to detect sulfidized nanoparticulate zero-valent iron (S-nZVI) in the subsurface. Lab experiments showed that S-nZVI rapidly reduced the fluorophore riboflavin within 200s. In quartz sand, 70 mg/kg of S-nZVI was detected by visible imaging. Based on these results, a direct-push probe (Dye-OIP) was designed based on Geoprobe's Optical Image Profiler (OIP) and equipped with a fluorophore injection port below the OIP-unit. The injectant consisted of riboflavin mixed with fluorophore rhodamine WT and was used to verify that the mixture was injected and detectable. Small scale experiments showed that the fluorescence of the mixture in S-nZVI-amended sand changed within 150s from green with a hue of ~50 to red with a hue of ~30 when imaged with Dye-OIP. Tests of the Dye-OIP after an S-nZVI injection in a 1 m^3 sized tank show that the tool could detect S-nZVI via fluorescence and visible imaging when S-nZVI concentration was >0.2 mg/g dry sediment. The method may detect S-nZVI in the subsurface without relying on infrastructure such as wells.

COMPARISONS OF FOUR METHODS FOR MEASURING TOTAL PETROLEUM HYDROCARBONS AND SHORT-TERM WEATHERING EFFECT IN SOILS CONTAMINATED BY CRUDE OIL AND FUEL OILS

Sun, Y., J. Ma, G. Yue, S. Liu, H. Liu, Q. Song, and B. Wu.
Water, Air, & Soil Pollution 232: 381(2021)

A study compared gravimetric, infrared spectrometry (IR), gas chromatography-flame ionization detection (GC-FID), and ultraviolet spectrophotometer (UV) methods for soil samples spiked by crude and fuel oils under non-weathered and short-term weathered conditions. The gravimetric method produced higher TPH recovery for less volatile samples, such as samples contaminated by motor oil and crude oil. The UV method reported very low TPH recovery and failed to provide meaningful results in all tested samples. The IR method is a quick and relatively inexpensive screening tool and generally resulted in high TPH recovery, but method precision and reproducibility were relatively low. The GC-FID method was relatively expensive and time-consuming but has several advantages, including being more selective to hydrocarbon, a high method precision, and reproducibility, and is capable of providing chemical fingerprint information. An appropriate method should be chosen carefully depending on oil contamination type and investigation purpose. Short-term simulated weathering experiment results showed 99.6% and 65.3% of TPH measured by the GC-FID method were removed, respectively, for the kerosene and diesel contaminated soils after 14 days of weathering at 50°C. Weathering is an important attenuation pathway at kerosene and diesel spill sites, thus the most cost-effective remediation strategy should be designed based on the oil type spilled.

General News

PFAS STRATEGIC ROADMAP: EPA'S COMMITMENTS TO ACTION 2021-2024

EPA, 26 pp, 2021

All levels of government—federal, Tribal, state, and local—need to exercise increased and sustained leadership to accelerate progress to clean up PFAS contamination, prevent new contamination, and make game-changing breakthroughs in the scientific understanding of PFAS. The EPA Council on PFAS developed a strategic roadmap to lay out EPA's whole-of-agency approach to addressing PFAS. The roadmap sets timelines for the Agency to take specific actions during the first term of the Biden-Harris Administration. The strategic roadmap builds on and accelerates implementation of policy actions identified in the Agency's 2019 action plan and commits to bolder new policies to safeguard public health, protect the environment, and hold polluters accountable. The actions described in this document represent important and meaningful steps to safeguard communities from PFAS contamination. EPA's integrated approach to PFAS is focused on three central directives:
•Research: Invest in research, development, and innovation to increase understanding of PFAS exposures and toxicities, human health and ecological effects, and effective interventions that incorporate the best available science.
•Restrict: Pursue a comprehensive approach to proactively prevent PFAS from entering air, land, and water at levels that can adversely impact human health and the environment.
•Remediate: Broaden and accelerate the cleanup of PFAS contamination to protect human health and ecological systems.
https://www.epa.gov/system/files/documents/2021-10/pfas-roadmap_final-508.pdf
See slides from October 2021 webinar: https://www.epa.gov/system/files/documents/2021-10/slides-epa-pfas-roadmap-public-webinars.pdf

VALIDATION OF STREAMLINED MOBILE LAB-BASED REAL TIME PFAS ANALYTICAL METHODS

Quinnan, J., P. Curry, M. Lupo, M. Miller, and M. Rossi. ESTCP Project ER19-5203, 242 pp, 2021

The objectives of this project were to demonstrate the application of three real-time mobile laboratory methods to analyze PFAS, including a standard DoD Quality Systems Manual approach, an accelerated liquid chromatography tandem mass spectroscopy method for quantitative screening, and a methylene blue active substances semiquantitative screening approach. The methods were applied using high-resolution site characterization and a stratigraphic flux to map PFAS migration pathways using a relative flux heat map. Soil to groundwater concentration ratios, lysimeter pore water sampling, and synthetic precipitate leaching procedures were used to evaluate source strength.
https://www.serdp-estcp.org/content/download/54083/531101/file/ER19-5203%20Final%20Report.pdf

HORIZONTAL DIRECTIONAL DRILLING AND WELL INSTALLATION FOR SUBSTRATE INJECTION

Ombalski, D. I FRC 2021: The 26th Florida Remediation Conference, 17-19 November Orlando, Florida, abstract, 2021

This presentation details proper horizontal directional drilling and well installation techniques along with a screen design case study. *See presentation from previous remediation seminar:* https://www.remediationseminar.com/images/presentations/DTD.pdf

BIOAUGMENTATION AS A GREEN TECHNOLOGY FOR HYDROCARBON POLLUTION REMEDIATION. PROBLEMS AND PROSPECTS

Nwankwegu, A.S., L. Zhang, D. Xie, C.O. Onwosi, W.I. Muhammad, C.K. Odoh, K.Sam, and J.N. Idenyi. I Journal of Environmental Management 304:114313(2022)

Advances in bioremediation, types and strategies conventionally adopted in contaminant clean-up are reported in this review. Natural attenuation and biostimulation are faced with notable limitations, including a poor remedial outcome under the natural attenuation system and the occurrence of residual contamination following a biostimulation application. Genetically engineered microorganisms show a potentially promising insight as a prudent remedial approach but are currently limited by ethical restrictions and the rural unavailability of the technology. It underscores that bioaugmentation, particularly the use of high cell density assemblages (microbial consortia), has promising remedial prospects and offers a more sustainable environmental security.

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.

Mention of non-EPA documents, presentations, or papers does not constitute a U.S. EPA endorsement of their contents, only an acknowledgment that they exist and may be relevant to the Technology Innovation News Survey audience.