Technology Innovation News Survey

Entries for May 1-15, 2022

Market/Commercialization Information

REMEDIAL ACTION OPERATIONS MULTIPLE AWARD CONTRACT(S) (RAOMAC) FOR PROJECTS AT VARIOUS LOCATIONS PREDOMINATELY IN THE NEW ENGLAND AREA (MAINE, MASSACHUSETTS, CONNECTICUT, RHODE ISLAND) AS WELL AS NAVY AND MARINE CORPS ACTIVE DUTY AND RESERVE FACILITIES

Naval Facilities Engineering Systems Command (NAVFAC) Atlantic, Norfolk, VA
Contract Opportunities at SAM.gov, Solicitation N4008521R0062, 2022

This is a total 8(A) set-aside under NAICS code 562910. The NAVFAC Atlantic requires a contractor to support environmental programs including Operation & Maintenance of environmental remedies and long-term monitoring at various locations in the U.S. with the majority in New England and the Mid-Atlantic. Work for this contract will involve the assessment of remedial action effectiveness by measuring levels of chemicals in various media, assessing their impact on biota, and comparing the results with cleanup levels. That information will be used to identify contaminant trends in the environment to optimize the operation and maintenance of the remedial action systems. Typical remedial actions systems may include but are not limited to: the construction of various soil, sediment and/or groundwater remediation systems that function as containment (e.g. soil cover, RCRA cap, slurry wall, pump-and-treat systems); in-situ treatment (e.g. natural attenuation, soil vapor extraction, enhanced bioremediation, air sparging) or ex-situ treatment (air stripping, constructed wetlands, offsite disposal, stabilization, solidification). Task Orders will be fixed-price with possible indefinite-quantity work. The maximum value of the total orders issued under the Small Business-RAOMAC is $30 million. Offers are due by 2:00 PM EDT on July 7, 2022. https://sam.gov/opp/c6710704d1744929826834c91acda228/view

IDIQ MULTIPLE AWARD TASK ORDER CONTRACT (MATOC) TO SUPPORT THE ENVIRONMENTAL REMEDIATION SERVICES (ERS) AND MILITARY RESPONSE PROGRAM (MMRP) PROGRAM (SRCSGT)

U.S. Army Corps of Engineers, Savannah District, Savannah, GA
Contract Opportunities at SAM.gov, Solicitation W912HN23S1000, 2022

This is a sources sought notice for market research purposes only under NAICS code 562910. The U.S. Army Corps of Engineers, Savannah District, is seeking industry information and feedback with regards to a future Indefinite Delivery, Indefinite Quantity (IDIQ) Multiple Award Task Order Contract to support Environmental Remediation Services (ERS) and the Military Response Program (MMRP). Work will be conducted at active military installations. The Contractor shall be responsible for providing services related to requirements of RCRA, CERCLA, the Clean Air Act, and other related Federal Programs in addition to State/Local specific regulations/requirements dealing with hazardous waste management/disposal and with Underground Storage Tanks, and other fuels related issues. The ERS actions may address both regulated and non-regulated toxic substances. As part of any site remediation activities, incidental construction may also be included in the task orders. Remedial actions may address both regulated and non-regulated toxic substances and emerging contaminants for customers of the U.S. Army Corps of Engineers. Traditional construction activities only related to restoration, renovations, repairs, and modernization of existing facilities are included. The future contract will be firm-fixed-price IDIQ for a wide range of environmental remediation services at various known or suspected Hazardous, Toxic, and Radioactive Waste or MMRP sites or Natural Resources areas. The contractor shall furnish all materials, equipment, supplies, personnel, and all other services required to perform the environmental services outlined in this performance work statement and as specifically identified in the individual task orders. The Contractor may be required to perform tasks on-site or at their own facilities. Capability statements are due by 4:00 PM EDT on June 24, 2022. https://sam.gov/opp/4b6bc2f1ec3e4f93bea857f8d5526ab7/view

F -- VIENNA WELLS OU1 & OU2 REMEDIAL ACTION (PRESOL)

U.S. Environmental Protection Agency, Region 7 Contracting Office, Lenexa, KS
Contract Opportunities at SAM.gov, Solicitation 68HE0722R0035, 2022

When the solicitation is released, it will be competed as a women-owned small business (WOSB) program set-aside NAICS code 562910. EPA Region 7 Acquisition & Management Branch is seeking the services of an experienced firm to provide remediation services for both the soil remedy at OU01 and the groundwater remedy at OU02 of the Vienna Wells Superfund Site in Vienna, Missouri. This includes demolition of the building, excavation and off-site disposal of contaminated soil, construction of a groundwater extraction well network to extract the shallow and deep groundwater for treatment, and operation of the groundwater extraction and treatment system during an operational and functional period of up to one year. The contractor shall be required to comply with all applicable federal, state, and local laws and regulations. Remediation will be conducted pursuant to CERCLA as amended by the Superfund Amendments and Reauthorization Action, and National Contingency Plan requirements. EPA anticipates an Indefinite Delivery/Indefinite Quantity contract with fixed-unit prices consisting of a three-year base period. The estimated dollar value for this procurement is between $8 and $12 million. https://sam.gov/opp/452da67057bb4aca8daaa1be7476886a/view

PFAS SOIL WASHING TREATMENT, EIELSON AIR FORCE BASE

U.S. Army Corps of Engineers, Pacific Ocean Division, Alaska District, Anchorage, AK
Contract Opportunities at SAM.gov, Solicitation W911KB22R0030, 2022

When the solicitation is released on or about June 24, 2022, it will be competed as an 8(A) set-aside under NAICS code 562910. The U.S. Army Corps of Engineers-Alaska District is seeking qualified firms to treat and dispose of approximately 131,000 cubic yards of stockpiled soil contaminated with Per-and Polyfluoroalkyl Substances (PFAS) resulting from construction associated with eight separate F-35 construction projects at Eielson Air Force Base in Alaska. Soil treatment shall be conducted on-site using Soil Washing (SW). Ultimately the contractor shall be responsible for ensuring the entire awarded volume of soil is treated to meet the target cleanup levels (TCLs, 18 AAC 75.341 Table B1, Migration to Groundwater) or disposed of. Disposal of residual soil not meeting TCLs after SW may occur at a permitted RCRA Subtitle C or D landfill with a leachate collection system or at an EPA-approved Class I Underground Injection Control facility. SW has been demonstrated to be successful at separating the soil fractions and ensuring that the sand and gravel components achieved the TCLs. Significant uncertainty exists regarding the ability to achieve TCLs in the finer-grained soil fraction (the fines account for approximately 22% of the total soil volume), which may require disposal. https://sam.gov/opp/e0946bd957c544b09bf6b35d270c6293/view

Cleanup News

SUSTAINABLE SURFACTANT ENHANCED AQUIFER REMEDIATION (SEAR) COMBINED WITH MULTI-PHASE EXTRACTION (MPE) OF COAL TAR LNAPL AND DNAPL IMPACTED BROWNFIELD SITE

Ivey, G. I REMTECH 2021: The Remediation Technologies Symposium, Banff, AB, Canada, 13-15 October, 40 slides, 2021

Two coal tar NAPL (and associated dissolved phase groundwater impacts) plumes emanating from former tar and liquor disposal wells at the former Bacchus Marsh gasworks site into the upper alluvial aquifer were impinging on upper alluvial aquifer utilization. Surfactant enhanced aquifer remediation (SEAR) was selected to address the coal tar NAPL in the aquifer. A non-ionic surfactant was used in various push-pull and recirculation methods to dissolve long-chain petroleum hydrocarbons and enhance coal tar recovery. Most of the coal tar NAPL was slightly denser than water (1.03 SG), had low viscosity at 15°C, and rested within the upper alluvial aquifer's clayey, sandy gravel lenses. After initial push-pull applications of SEAR, recirculation was established between the injection and extraction wells. The mobilized NAPL and micro-emulsified hydrocarbons were removed using multi-phase extraction technologies. SEAR remedial efforts are ongoing and have resulted in the extraction of coal tar LNAPL and DNAPL while also extracting dissolved contaminants (benzene, naphthalene, ammonia, cyanide) onto activated carbon and resin filters. Most extracted groundwater was returned to maintain/restore aquifer capacity and to meet sustainability goals.
Slides: https://esaa.org/wp-content/uploads/2021/10/RT21-Ivey.pdf
Longer abstract: https://esaa.org/wp-content/uploads/2021/10/RT2021-program-Abstracts-10.pdf

LNAPL MODELING AND SITE CLOSURE, OTTER CREEK TANK FARM AREAS 1 & 2, GOOSE BAY, NL

Thalheimer, A., B. MacLean, and N. Booth. I REMTECH 2021: The Remediation Technologies Symposium, Banff, AB, Canada, 13-15 October, 26 slides, 2021

Areas 1 & 2 of the Otter Creek Tank Farm historically contained eight ASTs ranging in size from 1,600,000 to 2,400,000 L. The site's LNAPL conceptual site model (LCSM) was updated, and a site management framework for closure was implemented to address outstanding data gaps around LNAPL and dissolved phase impacts. Primary lines of evidence of LNAPL behavior scenarios were evaluated using historical data, LNAPL characterization, stability, mobility, and recoverability, analyses of dissolved phase plume stability, monitored natural attenuation, and a natural source zone depletion evaluation using carbon dioxide and methane gas flux. The combined stability, mobility, and natural source zone depletion evaluations were used to identify the appropriate site management strategy for the LNAPL plume. The LCSM identified a behavior scenario that demonstrated that there was no unacceptable dissolved phase or LNAPL mobility risk, which suggested a site management strategy that did not require compositional control, saturation reduction, or contaminant containment. The residual LNAPL plume was risk-managed in place, without the need for long-term remediation and monitoring. The strategic approach resulted in cost savings (>$100,000) associated with optimized monitoring, use of innovative technology to measure CO_2/CH_4 flux, and timely and recurring data analysis.
Slides: https://esaa.org/wp-content/uploads/2021/10/RT21-MacLean.pdf
Longer abstract: https://esaa.org/wp-content/uploads/2021/10/RT2021-program-Abstracts-63.pdf

FIRST QUARTER 2021 GROUNDWATER MONITORING REPORT NUSTAR ANDOVER QUAIL CROSSING

W&M Environmental for the Kansas Department of Health and Environment, 285 pp, 2021

Upon discovering separate phase hydrocarbons (SPH) in an irrigation well, initial response and abatement activities included repair of the pipeline, soil excavation, deactivation of the irrigation well, and removal of SPH from the well. Following the initial response activities, interim remedial actions and investigations were performed, including an SVE pilot test to evaluate this technology for addressing petroleum hydrocarbons in the vadose zone soil, soil characterization to assess the lateral and vertical extent of impacted soil in support of soil excavation planning, two groundwater treatment pilot tests to evaluate the use of oxygen releasing compound (ORC) to address dissolved-phase petroleum hydrocarbons. Enhanced aerobic bioremediation was conducted by injecting 15,042 lbs of pelletized ORC Advanced® into the subsurface through temporary injection borings and monitoring wells in higher petroleum concentration areas. Groundwater monitoring supported the conclusion that the extent of dissolved phase hydrocarbons that exceeded Tier 2 Risk-Based Standards (RSKs) were stable or decreasing. Petroleum constituents were not detected or were detected at concentrations lower than KDHE Tier 2 RSKs in 13 of the 16 monitoring wells. Groundwater samples collected from five monitoring wells were analyzed for alkalinity, ammonia as nitrogen, carbon dioxide, orthophosphate, nitrate, sulfate, dissolved iron, potassium, and methane to monitor biogeochemical processes and aerobic conditions/activity following the cleanup action implementation. Analytical data indicate that aerobic and anaerobic biodegradation of petroleum hydrocarbons is ongoing.
https://www.kdhe.ks.gov/DocumentCenter/View/8053/First-Quarter-2021-Groundwater-Monitoring-Report-May-7-2021-PDF
All site documents: https://www.kdhe.ks.gov/909/Nustar-Pipeline-Release-North-Andover-Si

Demonstrations / Feasibility Studies

SUBGRADE BIOGEOCHEMICAL REACTORS (SBGRS) TO TREAT SOURCE AREA WITH DNAPL

Hockett, D., M. Perlmutter, D. Brown M. Louth, and D. Cleland. I 29th Annual David S. Snipes/Clemson Hydrogeology Symposium, 21 October, Clemson, SC, 23 minutes, 2021

A pilot study evaluated enhanced biotic and abiotic treatment of chlorinated solvents in groundwater. Impacted groundwater was recirculated through subgrade biogeochemical reactors (SBGRs) at an NPL site in North Carolina, where groundwater extraction and pump and treat have been the remedy since 1994. PCE concentrations (up to 65 mg/L), TCE concentrations (up to 35 mg/L), and 1,1,2,2-tetrachloroethane concentrations (up to 85 mg/L) were observed in groundwater from 25 to 100 ft bgs. Three SBGRs were constructed within test pit excavations where source material had been removed. SBGRs were backfilled with 40% (by volume) of 0.5- to 2.5- inch rounded river gravel and limestone gravel (50:50 mixture), 10% wheat straw, and 50% composted hardwood bark mulch. Fifteen lbs of soybean oil (to promote biotic reductive dechlorination), 15 lbs of a 50:50 mixture of iron pyrite sand, and zero-valent iron (to promote abiotic reduction of VOCs) were added per cubic yard of backfill mixture. Four recovery wells were installed to recirculate groundwater through the SBGRs to higher concentration areas. Recovery well piping was configured to directly extract groundwater to the SBGRs or the existing pump and treat system for operational flexibility. Influent concentrations varied during the pilot study but generally remained comparable to or less than baseline concentrations, ranging from 0.5 to 32 mg/L. Concentrations of chlorinated compounds in samples collected from the SBGR piezometers were less than method detection limits. Preliminary data from monitoring wells indicate reductions in chlorinated ethenes and ethane concentrations of >80%. Results of the pilot study included lessons learned during SBGR construction. The presentation includes implementation and detailed analysis of pilot study results. https://clemson.app.box.com/s/dmck2528clod6q7gevrxfiyg0qq5h6v1/file/906268154507

STABLE CARBON ISOTOPES FOR TRACING IN SITU RDX REMEDIATION

Boyd, T.J., R.H. Cuenca, and Y. Hagimoto in collaboration with M.M. Michalsen, C. Tobias, and J. Popovic. NESDI project number 537, 60 pp, 2021

This report summarizes project activities to track in situ RDX biodegradation. Small quantities of ^{13}C-labeled RDX were added to the environment using groundwater push-pull tests, and groundwater respiration products (CO_2 and CH_4) were analyzed over time. ^{13}C-enrichment in CO_2 and CH_4 was observed at two RDX-contaminated field sites at the Naval Base Kitsap-Bangor in Washington. The ^{13}C C-enrichment was modeled, and rate constants for RDX degradation were calculated. The technique was validated relative to RDX extinction models previously approved by federal and state regulators. A cost analysis for this technology relative to "standard" methods is included. https://apps.dtic.mil/sti/pdfs/AD1122062.pdf

IN SITU CHEMICAL REMEDIATION USING THE JET GROUTING TECHNIQUE: A FIELD TEST

Freitag, P. and T.G. Reichenauer.
Environmental Geotechnics [Published 28 March 2022 before print]

The feasibility of jet grouting to deliver oxidizing or reducing reagents into source zones was demonstrated at a former chemical laundry near Vienna, Austria. After extensive investigations, two remediation efforts were conducted with monitoring and sampling to study the effects of locally set measures. Drill core samples, liner samples, and membrane interface probes (MIPs) were examined and compared with data obtained from concentration measurements at observation wells. The project demonstrated the effectiveness of jet grouting and presented a novel approach using MIP sounding to assess remediation success. The sounding technique enables the investigation of a highly contaminated subsoil zone before and after the treatment, with measurements that directly show the success of the dechlorination.

REACTIVE TRANSPORT MODELING FOR SUPPORTING CLIMATE RESILIENCE AT GROUNDWATER CONTAMINATION SITES

Xu, Z., R. Serata, H. Wainwright, M. Denham, S. Molins, H. Gonzalez-Raymat, K. Lipnikov, J.D. Moulton, and C. Eddy-Dilek. | Hydrology and Earth System Sciences 26:755-773(2022)

A reactive transport model (Amanzi) was developed for radionuclides and used to evaluate how different scenarios under climate change will influence the contaminant plume conditions and groundwater concentrations. The approach was demonstrated using a 2D reactive transport model at the Savannah River Site F-Area, including mineral reaction and sorption processes. Different recharge scenarios were considered by perturbing the infiltration rate from the base case and considered cap-failure and climate projection scenarios. The study also evaluated the uranium and nitrate concentration ratios between scenarios and the base case to isolate the sorption effects with changing recharge rates. The modeling results indicated that the competing effects of dilution and remobilization significantly influence pH, thus changing the sorption of uranium. At the maximum concentration on the breakthrough curve, higher aqueous uranium concentration implies that sorption is reduced with lower pH due to remobilization. To better evaluate the climate change impacts in the future, a workflow was developed that included the downscaled CMIP5 (Coupled Model Intercomparison Project) climate projection data in the reactive transport model and used to evaluate how residual contamination evolves through 2100 under four climate Representative Concentration Pathway scenarios. Integrating climate modeling data and hydrogeochemistry models can quantify climate change impacts, assess which impacts need to be planned for, assist climate resiliency efforts, and help guide site management.

Research

RESEARCH BRIEF 330: STUDY SHEDS LIGHT ON BREAKDOWN PRODUCTS OF PCBS IN THE ENVIRONMENT

National Institute of Environmental Health Sciences, Superfund Research Program (SRP), June 2022

Researchers discovered toxic breakdown products of PCBs in contaminated sediments at proportionally higher levels than those found in commercial PCB mixtures. Findings point to environmental processes, such as animal, plant, or bacteria metabolism, in generating the harmful chemicals. To establish standards, the team analyzed sediment samples collected from the New Bedford Harbor Superfund site in Massachusetts, the Altavista Wastewater Lagoon in Virginia, and the Indiana Harbor Ship Canal in Indiana. The team used advanced analytical methods and statistical techniques to quantify chemical compounds and discovered 937 OH-PCBs and 209 PCBs in the samples. Concentrations of OH-PCBs in sediments varied by site, with the New Bedford Harbor site having the highest levels. Next, the team quantified OH-PCBs in four commercial Aroclors that make up >99% of those previously sold in the U.S. to determine if they originated from Aroclor mixtures or were generated in the environment. Higher levels of OH-PCBs were found in sediments than expected, with a proportion at least 30 times higher than PCBs attributed to Aroclors. The contribution of the original commercial mixtures to OHPCB contamination in sediments was negligible. The age and composition of the sediment and environmental factors like microbial communities, pH, salinity, and water flow played a role in forming different OH-PCBs between sites. Predominant OH-PCBs were identified at each site. Findings suggest that the breakdown of PCBs into OH-PCBs in the environment poses a significant threat to human and ecosystem health. More studies are needed to fully understand their production, movement, accumulation, and risk to humans. The study data is available in a free public data repository.
https://tools.niehs.nih.gov/srp/1/ResearchBriefs/pdfs/SRP_ResearchBrief_330_508.pdf

SURFACE 3D ELECTRICAL RESISTIVITY TOMOGRAPHY INVERSION OF 2005 BC CRIBS AND TRENCHES DATASETS

Johnson, T., J. Robinson, and V. Freedman. Pacific Northwest National Laboratory for U.S. Department of Energy, Report PNNL-32602 and DVZ-RPT-080, 25 pp, 2022

An electrical resistivity tomography (ERT) dataset was reprocessed at the BC Cribs and Trenches site in the Central Plateau of the Hanford site. The ERT survey mapped the plumes that resulted from the legacy discharges. The resistivity data were interpreted using geometric inversion to interpolate 2D lines into a 3D image. The resistivity data were reprocessed to fit a full 3D model of the bulk electrical conductivity using a newly developed geophysical code capability (E4D). This proof-of-concept model inversion was executed as the large dataset was well-suited for the use of high-performance computing. The 3D data reprocessing resolved the true bulk electrical conductivity; all of the resistivity data fit a single model of the bulk electrical conductivity, with true horizontal and vertical dimensions. This differed from the data interpretation approach that used geometric inversion to process 2D lines independently, which were then interpolated into a 3D image. The full 3D reprocessing and the 2D interpolation to a 3D image demonstrated a higher electrical conductivity observed immediately beneath the trenches and cribs. The electrical conductivity data strongly correlates with nitrate concentrations, indicating the presence of nitrate and other co-located contaminants.
https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-32602.pdf

BIOLOGICAL REDUCTIVE IMMOBILIZATION OF HEXAVALENT CHROMIUM FOR ACHIEVING STRINGENT REGULATORY LIMITS IN DRINKING WATER

Hlavacek, N. | 2022 Emerging Contaminants in the Environment Conference, 27-28 April, Champaign, IL, 13 slides, 2022

A biological Cr(VI) removal process based on biological reductive immobilization was developed and tested in a six-month lab study to reduce Cr(VI) in synthetic and actual groundwater samples. The presentation includes results and insights into the transformation of Cr based on analytical and genetic sequencing data. A bench-scale technology prototype reduced Cr(VI) from 50 to
https://www.ideals.illinois.edu/bitstream/handle/2142/114126/Hlavacek_Nikolaus_ECEC22.pdf?sequence=2&isAllowed=y

CARBON INJECTION TO SUPPORT IN-SITU SMOULDERING REMEDIATION

Wilton, G., Master's thesis, The University of Western Ontario, 159 pp, 2022

A study investigated carbon injection to support Self-Sustaining Treatment for Active Remediation (STAR) technology, which uses smoldering combustion to destroy organic contaminants embedded within a porous matrix to treat PFAS. Four solutions used in the study were 17% colloidal activated carbon (CAC), 23% CAC, 17% powdered activated carbon (PAC), and 23% PAC. Smoldering temperatures greater than those required for PFAS destruction were reached for all carbons when 50 g carbon/kg sand was achieved for injection and soil-mixing delivery methods. Emulsified vegetable oil was a successful secondary surrogate fuel to enhance smoldering temperatures further when supplied at a quantity less than or equal to carbon microparticles. Findings present the necessary intermediate lab work to evaluate methods to achieve PFAS treatment through STAR when applied in the field.
https://ir.lib.uwo.ca/cgi/viewcontent.cgi?article=11141&context=etd

EVALUATION OF EXTENSIVE SECONDARY MAXIMUM CONTAMINANT LEVEL EXCEEDANCES FOLLOWING REMEDIATION BY IN SITU CHEMICAL OXIDATION

Herman, J.P. and T.M. Missimer.
Groundwater Monitoring & Remediation 42(2):59-66(2022)

A study measured the occurrence and persistence of iron, manganese, sulfate, sodium, and total dissolved solids (TDS) in groundwater after concentrations remained above their respective regulatory criteria following persulfate in situ chemical oxidation (ISCO) to remediate petroleum contamination. The study also evaluated background concentrations and mobilization due to the petroleum contamination and ISCO application. Baseline sampling revealed substantially higher iron and manganese concentrations inside the plume area compared to the up-and down-gradient wells, suggesting mobilization due to the occurrence of redox reactions. Iron was not an ISCO component, yet concentrations spiked by 366% in the key monitoring well during the first post-remediation monitoring event. Ionic interactions between the ISCO amendment and native soils are likely responsible for displacing significant quantities of iron from the soil. Sulfate, sodium, and TDS exceedances were primarily associated with decomposition products of the ISCO amendments. The iron, manganese, sulfate, sodium, and TDS concentrations are trending downward over time but still exceed regulatory criteria or pre-ISCO concentrations.

ENHANCEMENT OF CEMENT-BASED SOLIDIFICATION/STABILIZATION OF A LEAD-CONTAMINATED SMECTITE CLAY

Ouhadi, V.R., R.N. Yong, and M. Deiranlou.
Journal of Hazardous Materials 403:123969(2021)

A study evaluated the influence of pH-dependent lead solubility patterns on the solidification/stabilization of contaminated smectite and ways to overcome problems associated with cement hydration through NaOH treatment. A series of physicochemical experiments were performed on untreated and NaOH-enhanced samples. Contaminated smectite with 5-100 cmol/kg-soil of lead nitrate was solidified/stabilized by 10-50% cement. The study demonstrated that solidification/stabilization is a pH-dependent phenomenon. Enhancement increases the contaminated soil pH, transferring lead components to a soluble form. XRD results showed a decrease in lead precipitation on cement components. Consequently, a noticeable increase in calcium silicate hydrate (CHS) formation was detected. The capsulation of lead ions by CSH improved the setting time and unconfined compressive strength of solidified/stabilized samples. Toxicity characteristic leaching procedure resulted in significantly reduced lead-leaching abilities of samples. Enhancement changed the governing retention phenomena from precipitation/stabilization in lead carbonate form to mainly capsulation/solidification by CSH. Results show a noticeable reduction in the required cement content.

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)

Aluminum (Al) injections into sediments and thin-layer capping with Polonite (calcium-silicate) with and without activated carbon (AC) were tested to simultaneously sequester sediment phosphorus (P), hydrophobic organic contaminants (HOCs), and metals from a eutrophic and polluted brackish water bay in Sweden. Sediment cores were collected and incubated in the lab to measure sediment-to-water contaminant release and effects on biogeochemical processes. Diffusive gradients in thin-film passive samplers for metals and semi-permeable membrane devices for PCBs and PAHs were used. Al injection into anoxic sediments stopped P release, reduced the cadmium (Cd, -97%) and zinc (Zn, -95%) release, and increased PAH (+49%) sediment fluxes compared to the untreated sediment. Polonite mixed with AC reduced P (-70%), Cd (-67%), and Zn (-89%) release but increased methane release. Adding AC to the Al or Polonite reduced HOC release by 40% in both treatments. Results demonstrate the potential of 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

General News

DEMONSTRATION AND VALIDATION OF NEW NON-INVASIVE TECHNOLOGY TO ASSESS CONTAMINANT STORAGE IN LOW PERMEABILITY MEDIA AND ROCK MATRIX

Iery, R., L. Slater, and F. Day-Lewis. | SERDP & ESTCP Webinar Series, Webinar #155, June 2022

SERDP and ESTCP sponsored webinars that focused on DoD-funded research to demonstrate geophysical approaches for estimating the rate coefficient governing dual-domain mass transfer (DDMT) and immobile porosity. Specifically, the investigators discussed the basis for monitoring DDMT using geoelectrical measurements, including a new borehole technology known as the

Mobile/Immobile Porosity Exchange Tool, and how geophysical methods can be utilized to constrain parameter estimation for DDMT.
https://www.serdp-estcp.org/Tools-and-Training/Webinar-Series/06-02-2022

ARSENIC REMEDIATION THROUGH SUSTAINABLE PHYTOREMEDIATION APPROACHES

Srivastava, S., A. Shukla, V.D. Rajput, K. Kumar, T. Minkina, S. Mandzhieva, A. Shmaraeva, and P. Suprasanna. | Minerals 11(9):936(2021)

This review discusses the prospect of As phytoremediation in soil and water bodies and the usefulness of various plant systems in terms of high biomass, high As accumulation, bioenergy potential, and economic utility. The review also highlights the potential and prospects of assisted phytoremediation approaches. *This article is* ***Open Access*** *at* https://www.mdpi.com/2075-163X/11/9/936/html

THE RAPID ADVANCEMENT OF ENVIRONMENTAL SENSORS IN REMEDIATION

Horst, J., N. Welty, J. Gallegos, D. Dunham, and A. Adams.
Groundwater Monitoring & Remediation 42(2):12-19(2022)

This article provides an overview of how sensors have evolved in environmental remediation, introduces a taxonomy to help understand them, and reviews important factors in how sensor systems are designed. Examples of advanced applications of sensors in environmental settings are provided that range from detecting local groundwater velocity, aerial and aquatic drones, and spectral imagery from satellites. The future use of sensors to support more effective environmental restoration is also discussed.

EMERGING CONTAMINANTS: FLUORINATED ALTERNATIVES TO EXISTING PFAS COMPOUNDS

Ruan, T., J. Field, I. Cousins, R. Lohmann, and G. Jiang (eds). Environmental Science & Technology Special Issue 56(10):6001-6792(2022)

This special issue includes research papers, a feature article, and a critical review that addresses the rapidly evolving landscape of detection, health effects, regulation, remediation, and the community response to PFAS contamination. National and international PFAS experts discuss state-of-the-art research and provide insights on advances in the field to benefit consumers, manufacturers, oversight and environmental agencies, and global health specialists. Contents cover a broad range of topics that include the methodology to characterize the structural diversity of PFAS alternatives; environmental distribution, bioaccumulation, transfer, and ecological impacts; transformation in the atmosphere and model animals; human exposure, epidemiology, and toxicological impacts; degradation and treatment techniques; and strategy for PFAS control.

PERSULFATE-BASED OXIDATION PROCESSES IN ENVIRONMENTAL REMEDIATION

Zhu, M., Z. Bian, and C. Zhao. (eds.) Royal Society of Chemistry, Print ISBN: 978-1-83916-308-1, PDF eISBN 978-1-83916-633-4, ePub eISBN 978-1-83916-634-1, 349 pp, 2022

This book summarizes environmental applications for persulfate-based advanced oxidation processes (AOPs). Topics include new activation methods and mechanisms and using of advanced materials for activating persulfate-based AOPs. *View the table of contents and abstracts at* https://pubs.rsc.org/en/content/ebook/978-1-83916-308-1.

COMBINED TECHNOLOGIES FOR THE REMEDIATION OF SOILS CONTAMINATED BY ORGANIC POLLUTANTS. A REVIEW

Zheng, W., T. Cui, and H. Li. | Environmental Chemistry Letters 20:2043-2062 (2022)

Combined remediation technologies to clean organic-contaminated soils are compared, focusing on physical-chemical, physical-chemical-biological, and biological-microbial methods. Physical-chemical methods are more widely used due to their high efficiency but are costly and alter soil properties. These issues can be alleviated by adding a biological treatment. More recent methods combine biological-microbial methods and rely on bioengineering.

THE POWER OF NATURAL PROCESSES: THE GROWING IMPACT OF NATURAL SOURCE ZONE DEPLETION ON PETROLEUM NAPL REMEDIAL STRATEGY

Rousseau, M. | SMART Remediation 3 February, virtual, 25 slides, 2022

This presentation will discuss natural source zone depletion (NSZD) processes and the most used techniques to estimate NSZD rates. It includes a case study illustrating how NSZD fit into the overall site management strategy, including detail on the implementation and results of the NSZD monitoring itself.
https://2ziapbmm3zh1x23mj335vjxt-wpengine.netdna-ssl.com/wp-content/uploads/2022/03/SMART-Remediation-Virtual-Feb-3-2022-Matthew-Rousseau.pdf

The Technology Innovation News Survey welcomes your comments and suggestions, as well as information about errors for correction. Please contact Michael Adam of the U.S. EPA Office of Superfund Remediation and Technology Innovation at adam.michael@epa.gov or (703) 603-9915 with any comments, suggestions, or corrections.

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