Technology Innovation News Survey

Entries for December 1-15, 2022

Market/Commercialization Information

FY23 CAROLINA GROUP OPTIMIZED REMEDIATION CONTRACT (PRESOL)
U.S. Army Corps of Engineers, Savannah, GA
Contract Opportunities on SAM.gov, Solicitation W912HN23R1000, 2023

When the solicitation is released on or about January 31, 2023, it will be competed as a total small business set-aside under NAICS code 562910. The U.S. Army Corps of Engineers, Savannah District, requires environmental remediation activities at Joint Base Charleston-Air, Joint Base Charleston-Weapons, and North Auxiliary Airfield, in South Carolina; and Seymour Johnson Air Force Base, in North Carolina. The range of activities includes maintenance of established remedies, optimization at applicable sites, and achievement of site-specific objectives. The Contractor shall undertake Environmental Remediation activities to achieve Performance Objectives at fifty-four Installation Restoration Program (IRP) sites and eleven Military Munitions Response Program sites. The award will be a firm-fixed-price contract with a ten-year period of performance. Offers are due by 1:00 PM EST on January 31, 2023.
https://sam.gov/opp/c677d5d1d2bb4013798504559293059d1/view

REGION 7, EMERGENCY RAPID RESPONSE SERVICES (ERRS) (SRCSGT)
U.S. Environmental Protection Agency, Region 7, Lenexa, KS
Contract Opportunities on SAM.gov, Solicitation 68HE0723R0021, 2023

This is a sources sought notice for market research purposes only. The U.S. Environmental Protection Agency (EPA), Region 7 Acquisition Management Branch, is seeking information from firms interested in providing services for the Emergency Rapid Response Services (ERRS) VI contract under NAICS code 562910. The purpose of the Region 7 ERRS contract is to provide and support fast, responsive environmental cleanup services for releases of hazardous substances, pollutants or contaminants, and discharges of oil. Environmental cleanup in response to natural and manmade disasters, terrorist activities, weapons of mass destruction, and nuclear, biological, or chemical incidents may also be required under this contract. This contract will support EPA Region 7's Superfund and Emergency Management Division (SEMD) and its Emergency Response, Planning, and Preparedness (ERPP) branch in fulfilling EPA's mission to protect human health and the environment. The proposed/contemplated vehicle will replace the current fifth iteration of this contract, ERRS V-contract # 68HE0718D0003, which is currently set to conclude on September 13, 2023. A formal synopsis and solicitation for ERRS VI is planned for February 2023. Interested parties who consider themselves qualified to perform these services are invited to submit a response to this RFI/Sources Sought notice. Responses are due by 12:00 PM EST on January 27, 2023.
https://sam.gov/opp/d769d6d4cdabe4702936f6c837bafa491/view

AQUEOUS FILM FORMING FOAM (AFFF) SUPPORT SERVICES MULTIPLE AWARD TASK ORDER CONTRACT (MATOC) (SOL)
U.S. Army Corps of Engineers, W2V6 USA Engineering Support Center, Huntsville, AL
Contract Opportunities on SAM.gov, Solicitation W912DY23R0001, 2023

This is a full and open competition with a small business reserve under NAICS code 562910. The U.S. Army Engineering and Support Center, Huntsville (CEHNC), in Huntsville, Alabama, is planning an acquisition for the procurement of Aqueous Film Forming Foam (AFFF) Support Services. AFFF support services will include removing, disposing, and replacing all foam-containing perfluoroalkyl substances (PFAS) from the existing fire protection systems on government installations. The proposed MATOC will support CEHNC in its role as a USACE Environmental and Munitions Support Center. The work is intended to support installations located throughout the United States, including Alaska and Hawaii, the U.S. Territories, U.S. Territorial waters, and Outlying areas (as defined by FAR 2.101). The award will be an Indefinite-Delivery, Indefinite-Quantity (IDIQ) Multiple Award Task Order Contract (MATOC) with a two-year base period and three one-year option periods. The estimated capacity for this procurement is $800,000,000 to be shared amongst all awardees. Offers are due by 5:00 PM CST on February 2, 2023. https://sam.gov/opp/8444ee3dcfa3422d8b3e37f09c869761/view

SINGLE AWARD TASK ORDER CONTRACT FOR REMEDIAL ACTION AND MONOFILL CONSTRUCTION, UMIAT AFS, ALASKA (PRESOL)
U.S. Army Corps of Engineers, Pacific Ocean Division, Alaska District, Anchorage, AK
Contract Opportunities on SAM.gov, Solicitation W911KB23R0002, 2022

When the solicitation is released on or about january 6, 2023, it will be competed as an 8(A) set-aside under NAICS code 562910. The U.S. Army Corps of Engineers (USACE), Alaska District, is planning to issue a request for proposals for performing a combination of on-site treatment and disposal, offsite disposal, and solid waste monofill construction at the Umiat Air Force Station FUDS located at Umiat, Alaska. The Umiat FUDS Landfill is a large unpermitted landfill created by the military services during the development of military assets in the north slope of Alaska in the late 1940s and 1950s. It is a complex contaminated site in a highly remote location that threatens to contaminate the adjacent Colville River and the traditional food sources of the native Alaskans in the region. Work will include designing the Hazardous, Toxic, and Radioactive Waste (HTRW) remedy and infrastructure improvements, mobilizing heavy equipment and technical specialists to the site, performing the necessary site improvements to conduct environmental sampling and studies, backhauling contaminated material, managing an onsite treatment system for non-hazardous contaminants, designing, constructing, installing, and maintaining hydraulic flood mitigation of the adjacent river, and conducting public meetings and stakeholder engagements. The resulting contract will be an Indefinite Delivery Indefinite Quantity (IDIQ) Single-Award Task Order Contract (SATOC) consisting of a three-year base period and two one-year option periods. The overall capacity of this small-business SATOC will be approximately $75 Million. Work will be issued as individual task orders and all task orders combined will not exceed the $75 Million contract threshold. The guaranteed minimum amount for each contract will be $10K. https://sam.gov/opp/a772374c3d354bf2bda14f11c95b7fee/view

Cleanup News

EXTENSIVE CHEMICAL AND BIOASSAY ANALYSIS OF POLYCYCLIC AROMATIC COMPOUNDS IN A CREOSOTE-CONTAMINATED SUPERFUND SOIL FOLLOWING STEAM ENHANCED EXTRACTION.
Titaley, I.A., L.S.D. Trine, T. Wang, D. Duberg, E.L. Davis, M. Engwall, S.L.M. Simonich, and M. Larsson. I Environmental Pollution 312:120014(2022)

Chemical and bioanalytical analysis of a creosote-contaminated soil collected from a Superfund site were analyzed pre- and post-steam enhanced extraction (SEE). Results showed a decrease of 64 polycyclic aromatic compounds (PACs) (5-100%) and an increase in the concentrations of nine oxygenated PAHs (150%), some of which are known to be toxic and can potentially contaminate groundwater. The freely dissolved PAC concentrations in soil were assessed using polyoxymethylene strips. Concentrations of 66 PACs decreased post-SEE (1-100%). Three in vitro reporter gene bioassays (DR-CALUX ®, ER alpha-CALUX ®, and anti-AR CALUX ®) were used to measure soil bioactivities pre- and post-SEE and all reporter gene bioassays measured soil bioactivity decreases post-SEE. Mass defect suspect screening tentatively identified 27 unique isomers of azaarenes and oxygen-PACs in the soil. SEE removed alkyl-PAHs and heterocyclic PACs reduced the concentrations of freely dissolved PACs and decreased soil bioactivities.

BNSF RAILWAY SKYKOMISH CLEANUP
Washington Department of Ecology fact sheet, 6 pp, 2022

Historical activities conducted at a railway facility resulted in petroleum contamination extending underground from the railyard, beneath the town, and into the South Fork of the Skykomish River. Cleanup efforts featured innovative and cutting-edge technologies, including a barrier wall and treatment system (HCC system) constructed along the north side of the railyard. The wall was designed to prevent the spread of petroleum contamination underneath the town. The system includes four flow-through treatment gates containing oil-water separators, a mixture of activated carbon and pea gravel filters, and nine groundwater extraction wells connected to a water treatment system. Groundwater is pumped through the HCC system, then discharged to the Town's stormwater system, which drains into the Skykomish River. A "passive" feature utilizes the barrier wall and the four carbon/pea gravel-filled flow-through gates to treat groundwater flowing from the railyard. The "passive" barrier wall was installed as a redundant backup to the "active" groundwater extraction system in case of mechanical failures and maintenance. Operational data suggests the barrier wall is vital to the containment system. In 2018, only the passive system operated with LNAPL skimmers, successfully concentrating areas of LNAPL to the system's collection trench, oil-water separators, and extraction wells. LNAPL has diminished to trace amounts in the recovery wells, and oil-water separators, so active skimming and pumping from recovery wells may no longer be needed. The HCC system was designed to provide the flexibility to allow the incremental shutdown of portions of the system as remediation progresses. Passive operation allows one to meet cleanup standards while reducing the operational environmental footprint. https://apps.ecology.wa.gov/publications/documents/2209162.pdf
For all site documents, see https://apps.ecology.wa.gov/cleanupsearch/site/34#site-documents

A NOVEL APPLICATION OF A GEOTECHNICAL SOIL STABILIZATION TECHNOLOGY FOR IMPROVED DELIVERY OF REMEDIAL AMENDMENTS
Richardson, S.D., J. Kolz, D.M. Hart, J.A. Long, N.W. Johnson, A.R. Denn, and C.J. Newell.
Remediation 33(1):25-38(2022)

A geotechnical technology, the "Grout Bomber," was repurposed for an environmental application to emplace ~800 vertical reaction columns containing zero-valent iron (ZVI), sand, and neat vegetable oil to treat CVOCs in lean clays and sandy clays. The reaction columns were closely spaced (2-3 ft apag) to accelerate the back diffusion of CVOCs from the low-k media to the reaction columns, where contact with ZVI and vegetable oil promotes abiotic and biotic reductive dechlorination of CVOCs, respectively. Overall, 35 tons of ZVI were emplaced into the 5,200 yd3 (~4,000 m3) source zone. Key benefits of this technology include rapid installation (average of 107 reaction columns/day), ease of remediation amendment mixing, consistent amendment dosing, and relatively low unit installation costs ($71/cubic yard of treatment zone). Application of the Grout Bomber relies on the diffusion of contaminants into the reaction columns from the surrounding low-k media, a process that occurs slowly over years to decades. A planning-level model showed that installing closely-spaced vertical reaction columns in a TCE-laden clay unit reduced the time to achieve maximum contaminant levels from > 500 years to ~26 years. Groundwater monitoring confirmed the establishment of a concentration gradient between the reaction columns, which promotes the diffusion of CVOCs toward the reaction columns. The presence of dissolved acetylene and gaseous "higher coupling" products (>C3) provide further evidence of ongoing abiotic reductive dechlorination within the reaction columns. *For more information on the Grout Bomber, see* https://serdp-estcp.org/projects/details/35567512-14e0-4061-9b29-4794910999c5

Demonstrations / Feasibility Studies

PILOT-SCALE STUDY FOR IN-SITU LEACHING OF RESIDUAL URANIUM FROM REMEDIATED SOIL
Deepak L. Bhojwani, Glen P. Anderson, Matthew C. Faryan.
Waste Management Symposium, 6-10 March, Phoenix, Arizona, 14 pp, 2022

A site-specific in situ leaching (ISL) process was developed to remediate soil at the Former Rare Earths Facility (REF) in West Chicago. Historical remediation activities remediated the soil to meet the soil cleanup standards and were used to backfill three sheet-piled areas (Pond 1, Pond 2, and South Factory East). The remediated soil contains residual uranium, which continues to leach into groundwater at levels exceeding the groundwater protection standard (GWPS). A Pilot-Scale Study was conducted to design an ISL system and assess scale-up issues, including critical success factors and limitations, duration, cost, and the feasibility and effectiveness of ISL to leach residual uranium from the previously remediated soil. The study was conducted in an in-ground treatment cell, bounded by steel sheet piling and containing ~60 cubic meters of soil. A leaching solution comprised of 0.60 mol/L of sodium bicarbonate and 0.23 mol/L of sodium carbonate in natural groundwater was circulated in the treatment cell. The ISL system successfully treated a large soil volume under field conditions, removing ~54% of the initial uranium mass in five pore volume flushes, attaining the uranium GWPS. Results were consistent with previous treatability studies completed under controlled lab conditions and confirmed that ISL is a viable treatment option for addressing residual uranium in the REF soil. The leachate generated during the leaching process will require treatment and disposal. Uranium Leaching of uranium resulted in the unintended leaching of several non-uranium and inorganic constituents. Several reported constituents exceeded their corresponding site-specific effluent standards and will require management and treatment as part of the leachate treatment program. Full-scale operations should consider alternative methods for preparing and applying leaching solutions. Accumulation of undissolved leaching solution constituents (sodium bicarbonate and sodium carbonate) on the soil surface required hydrochloric acid neutralization to halt the uranium leaching process.
https://www.westonsolutions.com/wp-content/uploads/2022/07/Pilot-Scale-In-situ-leaching-of-Residual-Uranium-22404a.pdf

SPATIAL-TEMPORAL TRENDS AND CORRELATIONS FROM A LARGE NATURAL SOURCE ZONE DEPLETION (NSZD) RESEARCH PROJECT AT A SITE WITH LNAPL
Ganna, S., P.R. Kulkarni, S. Garg, and C.J. Newell.
Bioremediation Journal [Published online 11 November 2022 before print]

Natural source zone depletion (NSZD) measurements at 12 locations with up to four years of monitoring using carbon traps and thermal NSZD technology were conducted as part of an extensive NSZD research project. Location-specific site characterization data was compiled to evaluate factors impacting NSZD rates. Both methods resulted in site-wide average NSZD rates of 280 gal/acre/year for thermal NSZD measurements and 360 gal/acre/year for carbon trap measurements. These values were relatively consistent based on the temporal and spatial variability in the NSZD data. Data support the case that NSZD is actively removing LNAPL. Annual temporal rates generally varied by a factor of ~two during the monitoring period. The spatial distribution of NSZD rates across the site for the methods ranged from 80-890 gal/acre/year. While the site-wide NSZD rates were relatively consistent, the location-specific carbon trap and thermal NSZD data had a weak correlation with a linear regression r2 of 0.4. The correlation between the spatial distribution of the NSZD rates and nine specific lithological, concentration, LNAPL distribution, and LNAPL composition factors showed strong correlations with only two of the factors: (1) a positive correlation to the fraction of LNAPL in the saturated zone as indicated by a rapid optical screening tool; and (2) a negative correlation to locations with significant clay in the geologic boring log. Results confirmed the observations from other field studies that showed significant temporal, spatial, and methodological variation in the NSZD rates at LNAPL sites. More importantly, these results support the conclusion that NSZD is active even for submerged LNAPL.

REMEDIATION OF CHLORINATED ALIPHATIC HYDROCARBONS (CAHS) CONTAMINATED SITE COUPLING GROUNDWATER RECIRCULATION WELL (IEG-GCW®) WITH A PERIPHERAL INJECTION OF SOLUBLE NUTRIENT SUPPLEMENT (IEG-C-MIX) VIA MULTILEVEL-INJECTION WELLS (IEG-MIW)
Ciampi, P., C. Esposito, E. Bartsch, E.J. Alesi, G. Rehner, and M.P. Papini.
Heliyon 8(11):e11402(2022)

An innovative Groundwater Circulation Well (GCW) process was configured, installed, and tested to optimize the distribution of a soluble nutrient supplement in a heterogeneous aquifer for reductive dehalogenation. The process generated an in-situ bioreactor for enhanced treatment of chlorinated aliphatic hydrocarbons (CAHs). The novel system combined a vertical recirculation well (IEG-GCW) and four multilevel injection wells (IEG-MIWs) to introduce the carbon solution into a TCE-contaminated aquifer site in Barcelona, Spain. A 12 m deep IEG-GCW equipped with two screened sections was located in the center of the four IEG-MIWs. The GCW-induced flow moves the groundwater in an ellipsoidal recirculation cell to spread the supplements from the central GCW and from the peripheral MIWs in the aquifer body. Two multilevel sampling wells (IEG-MLSWs®) in the radius of influence monitor the remediation process to capture hydrochemical variations along the vertical aquifer sections. A multi-source model harmonizes geological and hydrochemical information during different remediation stages, guiding the adaptation of the remediation strategy to physicochemical conditions and unmasking the decontamination mechanics induced by the remedial actions. Hydrochemical monitoring of MLWS and the stable carbon isotopic signature of cis-1,2-DCE and VC show the mobilization of secondary contamination sources triggered by recirculation during remediation, the stimulation of microbiological activity following nutrient supplement via GCW and MIWs, and the strong decrease of CAHs concentrations at different aquifer levels. Evidence from the first application at the field scale shows a significant increase in the chloroethane biodegradation rate and the short-term effectiveness of the strategy. GCW-MIWs synergy represents a promising strategy to degrade CAHs in a shorter period by combining a controllable hydraulic system, effective nutrient distribution, and monitoring of the remediation process.
https://reader.elsevier.com/reader/sd/pii/S2405844022026901?token=9EB771186A767E4288B7E14A6785AADEA4495576dC0218581E26005A8CBDEAC06874E31E4E6A224EB7EBABC22EE02A9&originRegion=us-east-1&originCreation=20221111

Research

SAMPLING DEVICE HARNESSES POWERFUL MOLECULAR INTERACTIONS, OVERCOMES BARRIERS IN DETECTING VOLATILE CONTAMINANTS
National Institute of Environmental Health Sciences, Superfund Research Program (SRP), Research Brief # 336, 2 pp, December 2022

A NIEHS Superfund Research Program (SRP)-funded study showed how unique microsensors that harness powerful molecular interactions can selectively detect trace amounts of aromatic VOCs in the environment. Sensors were fabricated by creating functionalized gold nanoparticle cores surrounded by a layer of ligands, called thiols, that attach tightly to positively charged metal atoms. Then, the sensing material was integrated into an electrical circuit to create a specialized chemical sensor that detects and responds to interactions between the positively charged metals and the electron-rich rings of specific BTEX compounds. Next, the study evaluated which metals - lithium, sodium, or potassium – performed best in the sensor for aromatic VOCs in terms of sensitivity and selectivity. The electrical response to individual VOCs – benzene, toluene, ethylbenzene, xylene, nitrobenzene, cyclohexane, ethanol, and acetone – across a range of concentrations from 5 parts per million to 100 ppb was measured. The study sought to clarify the specific molecular interactions underlying the sensor's performance and whether environmental conditions, such as humidity, altered the results. The robust responses to electron-rich aromatic VOCs suggest their nanoparticle-based sensors could enhance the ability to rapidly detect compounds at low concentrations, which may better clarify what VOCs people are exposed to and their potential health risks. https://tools.niehs.nih.gov/srp/1/ResearchBriefs/pdfs/SRP_ResearchBrief_336_508.pdf

EARLY BREAKTHROUGH OF SHORT-CHAIN PERFLUOROALKYL SUBSTANCES IN ADSORPTIVE MEDIA TREATMENT
Crawford, S., R. Thomas, F. Taylor, S. Dore, M. Marley, L. Crawford, J. Occhialini, T. McKnight, and N. Farmer. I Remediation 32(3):177-193(2022)

Treatability testing using batch-equilibration reactors and column flushing apparatus experiments was implemented to compare removal efficiency, breakthrough, and longevity of absorbents in PFAS-impacted groundwater. Adsorbents tested included surface-modified natural media, synthetic resin, and activated carbon (AC). Surface-modified natural media and AC achieved >99% removal of all detected PFAS after ~10,300-bed volumes (16 weeks) of column flushing and outperformed the selected resin under site-specific conditions. In addition, unconventional breakthrough patterns (i.e., the breakthrough of longer-chain PFAS before shorter-chain PFAS) were observed for some PFAS, including perfluoropentanoic acid, perfluorohexanesulfonic acid, and perfluorooctanesulfonic acid. While the generally accepted breakthrough patterns for PFAS can be reasonably anticipated, column flushing studies were preferred over batch sorption tests to reveal site-specific or media-specific breakthrough patterns that can impact overall performance.

APPLICATION OF HYDROTHERMAL ALKALINE TREATMENT FOR DESTRUCTION OF PER- AND POLYFLUOROALKYL SUBSTANCES IN CONTAMINATED GROUNDWATER AND SOIL

Hao, S., Y.J. Choi, R.A. Deeb, T.J. Strathmann, and C.P. Higgins
Environmental Science & Technology 56(19):6647-6657(2022)

Hydrothermal alkaline treatment (HALT) was applied to two groundwater samples and three soil samples from AFFF-impacted sites. PFAS destruction was characterized using high-resolution mass spectrometry. The 148 PFAS identified in field samples, including 10 cationic, 98 anionic, and 40 zwitterionic PFAS, were mostly degraded to nondetectable levels within 90 min when treated with 5 M NaOH at 350°C. The near-complete defluorination, as evidenced by fluoride release measurements, confirmed the complete destruction of PFAS. While many structures, including perfluoroalkyl carboxylic acids and polyfluorinated substances, were readily degraded, PFSA, C_nF_{2n+1}-SO_3^-), most notably with short chain lengths (n = 3-5), were more recalcitrant. PFSA destruction rates in groundwater samples were similar to those measured in lab water solutions. Reactions in soil were slow, presumably due to the base-neutralizing properties of the soil. The degradation of PFAS in groundwater and soil was a function of reaction temperature, NaOH concentration, and reaction time.

USE OF A HORIZONTAL BALL MILL TO REMEDIATE PER- AND POLYFLUOROALKYL SUBSTANCES IN SOIL
Battye, N.J., D.J. Patch, D.M.D Roberts, N.M. O'Connor, L.P. Turner, B.H. Kueper, M.E. Hulley, and K.P. Weber. I Science of The Total Environment 835:155506(2022)

A study evaluated the effectiveness of horizontal ball mills in degrading PFOS, 6:2 FTSA, and aqueous film-forming foam (AFFF) spiked on nepheline syenite sand. Horizontal ball milling was also applied to sand-dominant and clay-dominant soils collected from a firefighting training area. Liquid chromatography-tandem mass spectrometry was used to track 21 target PFAS throughout the milling process. High-resolution accurate mass spectrometry was also used to identify the presence and degradation of 19 non-target fluorotelomer substances, including 6:2 fluorotelomer sulfonamido betaine, 7:3 fluorotelomer betaine, and 6:2 fluorotelomer thioether amido sulfonate. In the presence of potassium hydroxide, used as a co-milling reagent, PFOS, 6:2 FTSA, and the non-target fluorotelomer substances in the AFFF underwent upwards of 81%, 97%, and 100% degradation, respectively. Despite the inherent added complexity associated with field soils, better PFAS degradation was observed on the FFTA soils over the spiked NSS, and more specifically, on the FFTA clay over the FFTA sand. Results held through scale-up, going from the 1 L to the 25 L cylinders, and support further scale-up in preparation for onsite pilot tests.

FORMATION OF IN-SITU MICROEMULSION AND ITS EFFICIENCY FOR RESIDUAL PCE REMOVAL IN LOW TEMPERATURE AQUIFERS
Mo, Y., J. Dong, Y. Li, X. Liang, and J. Bai.
Colloids and Surfaces A: Physicochemical and Engineering Aspects 656(Part A):130461(2023)

A study established in situ microemulsion for low-temperature aquifers via the ε-β fishlike phase diagram, investigated the solubilization capacity and size distribution of microemulsion at ~10°C and evaluated the remediation efficiency of microemulsion flushing to remove residual PCE. Microemulsion precursor composition of 6.0 wt% compound surfactants (Tween80: SDS=3:2), 8.0 wt% isopropyl alcohol (IPA), and 3.0 wt% NaCl was prepared to form microemulsion with PCE in situ. The PCE apparent solubility of 80.28 g/L at 10°C, was three orders of magnitude higher than that in water at the same temperature, ~ 0.06 g/L. The solubilization capacity was inversely proportional to temperature and IPA concentration, whereas proportional to Na $^+$ concentration. The microemulsion droplets size were enlarged with the increase of IPA concentration, Na+ concentration and PCE solubilization by DLS experiments. Sand column flushing using various eluents (water, micelle solution, in situ microemulsion) was conducted to determine the removal efficiency for residual PCE. In situ microemulsion formulations achieved removal efficiency of 97.1% for residual PCE, which was higher than that flushed via water (~54.6%) and micelle solution (1.1%). Results confirm the feasibility of in situ microemulsion for remediating DNAPL-polluted aquifers.

SEDIMENT REMEDIATION USING ACTIVATED CARBON: EFFECTS OF SORBENT PARTICLE SIZE AND RESUSPENSION ON SEQUESTRATION OF METALS AND ORGANIC CONTAMINANTS
Ramo, R., S. Bonaglia, I. Nybom, A. Kreutzer, G. Witt, A. Sobek, and J.S. Gunnarsson.
Environmental Toxicology & Chemistry 41(4):1096-1110(2022)

A study compared the capping efficiency of powdered activated carbon (PAC) against granular activated carbon (GAC) using contaminated sediment from Oskarshamn harbor, Sweden, and investigated the effects of resuspension on contaminant retention and cap integrity. Three thin-layer caps, consisting of PAC or GAC mixed with clay or clay only, were added to the sediment surface of intact cores collected from the outer harbor. Resuspension was created using a motor-driven paddle to simulate propeller wash from ship traffic. Passive samplers were placed in the sediment and the water column to measure the sediment-to-water release of PAHs, PCBs, and metals. A thin-layer cap with PAC reduced sediment-to-water fluxes of PCBs by 97% under static conditions and 91% under resuspension. Thin-layer capping with GAC was less effective than PAC but reduced fluxes of high-molecular-weight PAHs. Thin-layer capping with activated carbon was less effective at retaining metals, except for Cd, the release of which was significantly reduced by PAC. Resuspension generally decreased water concentrations of dissolved cationic metals, perhaps because of sorption to suspended sediment particles. Sediment resuspension in treatments without capping increased fluxes of PCBs with log octanol-water partitioning coefficient (KOW) > 7 and PAHs with log K OW of 5–6, but resuspension reduced PCB and PAH fluxes through the PAC thin-layer cap. Overall, PAC performed better than GAC, but adverse effects on the benthic community and transport of PAC to non-target areas are drawbacks that favor the use of GAC. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9306760/pdf/ETC-41-1096.pdf

General News

NEW EM GROUNDWATER MONITORING, REMEDIATION INITIATIVES TO ADVANCE CLEANUP
DOE Office of Environmental Management website, August 30, 2022

DOE's Office of Environmental Management (EM) has developed a series of innovative initiatives to support improved groundwater monitoring and remediation across the DOE complex, including a new publicly available web-based application. The Tracking Restoration and Closure (TRAC) application uses a combination of infographic and story map tools to communicate information on progress toward site closure. The system visually presents complex information, making it more digestible for those who may not be groundwater experts while still providing all the critical technical information in one place. As part of National Water Quality Month, EM announced other groundwater-related initiatives that will work in concert with TRAC, including the Advanced Long-Term Environmental Monitoring Systems (ALTEMIS) and a new soil and groundwater remediation strategy. The TRAC application features a map of all EM sites with metrics on high-priority contaminants of concern. Users can zoom in to specific sites to view geospatial footprints of groundwater plumes and their remediation strategies and get updates and information on progress toward site closure. TRAC also enables effective communication with regulators, stakeholders, and partners, enhancing EM's ability to identify efficiencies for remediation. https://www.energy.gov/em/articles/new-em-groundwater-monitoring-remediation-initiatives-advance-cleanup
Access TRAC at https://www.pnnl.gov/projects/trac

REVIEW OF THE CONTINUED ANALYSIS OF SUPPLEMENTAL TREATMENT APPROACHES OF LOW-ACTIVITY WASTE AT THE HANFORD NUCLEAR RESERVATION: REVIEW #2
National Academies of Sciences, Engineering, and Medicine, National Academies Press, 62 pp, 2022

DOE plans to use vitrification for all of the high-level radioactive waste at Hanford. However, because the volume of "low-activity waste" exceeds DOEs capacity limits for vitrification, DOE must decide how to treat the remaining "supplemental low-activity waste" (SLAW) so that it can be safely disposed of at a near-surface disposal site. To help inform its decision, the Federally Funded Research and Development Center (FFRDC), led by Savannah River National Laboratory, analyzed three potential alternative technologies and reported its findings. The National Academies reviewed the FFRDC report in terms of its value for decision-making and how well it meets various Congressional requirements related to the Hanford cleanup. The review concludes that the FFRDC report is overall very strong, provides a useful framework for evaluating the technology options, and is responsive to guidance from the National Academies review. Recommendations for strengthening the report include estimating a lifecycle cost profile for constructing and operating each alternative and providing more in-depth discussion on potential challenges that may need to be addressed to obtain the necessary various regulatory approvals. *Read for free at* https://nap.nationalacademies.org/read/26632/chapter/1.

NATURAL SOURCE ZONE DEPLETION: AN IMPORTANT TOOL TO MANAGE PETROLEUM AND LNAPL CONTAMINATED SITES
Zimbron, J. I OGWA Virtual Workshop on Hydrocarbon Site Management, 13 January, abstract only, 2022

This presentation provides an overview of biogeochemical processes related to natural source zone depletion (NSZD), including examples of methods for data collection that are easy to implement yet are key to managing LNAPL-contaminated sites. These include mapping the lateral extent of LNAPL sources based on vapor-based surveys of biogas profiles (methane and carbon dioxide) at dedicated points or existing monitoring wells, quantifying the in situ biodegradation (NSZD) rates of LNAPL, and comparing the field-measured NSZD rates with active remediation technologies. These examples consistently illustrate the benefits of understanding NSZD processes to cost-effectively manage remediation projects and assess the risk associated with LNAPL sites. *See recording of presentation from Microbial Insights Webinar:* https://www.youtube.com/watch?v=nF-FfTvAx6k

ANALYTICAL METHODS FOR ENVIRONMENTAL CONTAMINANTS OF EMERGING CONCERN
Fontanals, N. and R.M. Marce. (eds.) Wiley. ISBN: 978-1-119-76386-4, 400 pp, 2022

This book presents current methods to determine families of organic contaminants of emerging concern (CECs) in environmental samples. Each section is devoted to a particular family of CECs, covering different analytical methods supported by examples of both cutting-edge research and commonly used methods. An international panel of experts describes every step of the analytical procedures, including sample preparation, chromatographic separation coupled to mass spectrometry or other instrumental techniques. Specific requirements are linked to the properties of the contaminants and the sample matrix for each procedure presented. The book also:

- Covers different types of aqueous, solid, and atmospheric samples.
- Includes up-to-date information on CEC properties, relevant legislation, reported or potential metabolites/transformation products, and environmental occurrence.
- Addresses CECs such as novel psychoactive substances, artificial sweeteners, musk fragrances, disinfection byproducts, and microplastics.
- Offers practical tips and advice on special care procedures to assist readers in CEC determination.

For the table of contents and Chapter 1, see https://www.wiley.com/en-us/Analytical+Methods+for+Environmental+Contaminants+of+Emerging+Concern-p-9781119763864.

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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