Entries for November 1-15, 2024

Market/Commercialization Information

F -- ERRS REGION 1 AND REGION 2 VIRTUAL INDUSTRY EVENT (SNOTE)
U.S. Environmental Protection Agency, Region 2 Contracting Office, New York, NY
Contract Opportunities on SAM.gov 68HE0225R0001, 2024

EPA Region 1 and Region 2 will be hosting a webinar in Microsoft Teams on Thursday, December 19, from 2:00 - 3:00 PM EST to provide information regarding the EPA's CERCLA Emergency and Rapid Response Services (ERRS) contracts that fall under NAICS code 562910. The purpose of this Webinar Virtual Industry Event is to engage industry partners and support market research in preparation for EPA's upcoming contracting efforts for its CERCLA Emergency and Rapid Response Services (ERRS) contracts in Region 1 and Region 2. The Webinar will provide a brief overview of the requirements with examples of various types of work and activities expected to be performed and required response time frames. To register for this event, visit https://events.gcc.teams.microsoft.com/event/20580267-f7cb-4e93-8663-52501d13d0e5@88b378b3-6748-4867-acf9-76aacbeca6a7
https://sam.gov/opp/3c646f380bf84f0998ebf07540695d71/view

S -- PROJECT SITE SPILL RESPONSE AND WASTE DISPOSAL (COMBINE)
U.S. Army Corps of Engineers, Mississippi Valley Division, Memphis District, Memphis, TN
Contract Opportunities on SAM.gov W912EQ25Q0012, 2024

This is a full and open competition under NAICS code 562211. The U.S. Army Corps of Engineers, Memphis District, requires a contractor to provide spill response services, removal, recycling and/or disposal of universal solid waste at the Ensley Engineer Yard and Ensley Engineer Yard Mooring Facility in Memphis, Tennessee; the Graham Burke Pumping Plant in Marianna, Arkansas; the W.G. Huxtable Pumping Plant in Elaine, Arkansas; the DD17 Pumping Plant in Dell, Arkansas; the Richardson Landing Casting Field Facility in Drummonds, Tennessee; and any Ports located approximately 350 miles north or south of Ensley Engineer Yard. Please note this solicitation requires offerors to enter a National Institute of Standards and Technology (NIST) score in the Supplier Performance Risk System (SPRS) prior to responding to this solicitation. The NIST score is a responsiveness item. Bids/offers from contractors with a NIST score in SPRS will be considered responsive and evaluated/considered for award. Those without a NIST score in SPRS will be deemed NON-RESPONSIVE and thus not evaluated/considered for award. The period of performance for this contract will be five years with one-year ordering periods. Offers are due by 10:00 AM CST on January 6, 2025. https://sam.gov/opp/52cf7075e7944ce5850f0f045e664149/view

Z -- ENVIRONMENTAL REMEDIAL ACTION CONTRACT (PRESOL)
U.S. Department of the Navy, Naval Facilities Engineering Systems Command (NAVFAC), Atlantic Command, Norfolk, VA
Contract Opportunities on SAM.gov N62470_24_R_0072, 2024

When this solicitation is released on or about January 3, 2025, it will be competed as a total small business set-aside. The U.S. Department of the Navy intends to award a Cost-Plus-Award-Fee Indefinite Delivery/Indefinite Quantity type contract for one base year and four one-year option periods to support the remediation of sites ranked on the NPL as well as non-NPL sites regulated under CERCLA, RCRA, the Underground Storage Tanks regulations, state-specific regulations, and other sites which might require remedial action. Work under this contract will be performed primarily in Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina Tennessee, Texas, Vermont, Virginia, West Virginia, Wisconsin, the areas of the District of Columbia, and Puerto Rico. Work could also include Base Realignment and Closure Program and Non-CERCLA sites throughout NAVFAC Atlantic's area of responsibility. Although principal sites are identified for the contract, the contractor may be required to perform at any Naval or Marine Corps activity in the area of responsibility covered by NAVFAC Atlantic. Work may also be added and performed anywhere outside of NAVFAC Atlantic's area of responsibility, as required by the Government. The total maximum value for the contract is $95,000,000 inclusive of the base year and all options. Work will be performed by the issuance of task orders. There is no solicitation at this time.
https://sam.gov/opp/9de092bf27c1444e8fbe2f54d819399b/view

F -- HEXAVALENT CHROMIUM REMOVAL (SOL)
U.S. Department of the Army, National Guard Bureau, Middletown, PA
Contract Opportunities on SAM.gov W50S9225QA001, 2024

This is a total small business set-aside under NAICS code 562910. The U.S. Department of the Army, National Guard Bureau, seeks a contractor to remove Hexavalent Chromium from various work offices in an aircraft hanger located at the 193rd Special Operations Wing in Middletown, Pennsylvania. Questions are due by 12:00 PM EST on December 20, 2024. Offers are due by 4:30 PM EST on December 30, 2024. https://sam.gov/opp/80501cd10dc2464aaeb1b6c7d42ea8c0/view

Return to top

Cleanup News

BOUNTIFUL SUPERFUND CASE STUDY UPDATE: REVIEW OF LONG-TERM PERFORMANCE OF COMBINED PERMEABILITY ENHANCEMENT AND CHEMICAL REDUCTION IN LOW PERMEABILITY SOILS WITH RESIDUAL DNAPL
Kessell, L. I DCHWS West 2024 Fall Symposium, 6-8 November, Denver, CO, 22 slides, 2024

Multiple bioremediation amendment injections at the Bountiful/Woods Cross Operable Unit 1 Superfund site were performed to reduce the source area and mitigate the dilute downgradient plume. While bioremediation was effective in the higher permeability sandy soils, rebound occurred in several areas in the silty low permeability zones highlighting potential limitations in the remedial design or in the conceptual site model (CSM) established by the original Remediation Investigation. Additional high-resolution site characterization was performed to better quantify the extent of residual NAPL and/or low permeability zones that resulted in rebound and limited performance of initial remediation approaches. The improved data supported a revised CSM that refined the limiting conditions and supported an optimized remediation approach centered on implementing permeability enhancement with chemical reduction. Hydraulic injection propagation mechanics are key to the injection method and can facilitate overcoming challenges associated with low permeability lithologies. Using proppants improves reagent delivery and increases the hydraulic conductivity required to achieve controlled groundwater flux. Injectate verification methods used at the site revealed a complex interconnected nesting of low- to high-angle oblique injectate planes resulting from proximal injection fields. Hydraulic conductivity studies of sand and ZVI media revealed improved hydraulic conductivity within the injection lenses, leading to hydraulic control of groundwater flow through the treatment zone. Increased and controlled groundwater transport through the target treatment zone was one of the primary benefits of the permeability enhancement, along with the secondary benefit of reducing back-diffusion time frames. The presentation includes performance data for bioremediation approaches and the subsequent permeability enhancement with chemical reduction. https://mediacdn.guidebook.com/upload/213715/Kc1k6BCM5yyhX5c6mhm5LKfP02Rchc2FWBL1.pdf

FAST-TRACK IMPLEMENTATION OF THE FIRST IN SITU THERMAL TREATMENT SYSTEM AT AN ACTIVE AIR NATIONAL GUARD BASE
Perlmutter, M. I DCHWS West 2024 Fall Symposium, 6-8 November, Denver, CO, 28 slides, 2024

Historical operations at Building 1304 at the Montgomery Air National Guard Base impacted soil and groundwater with cVOCs, hindering site redevelopment. A Non-Time Critical Removal Action was initiated to address TCE, VC, and 1,2,3-trichloropropane concentrations in soil that exceeded state screening levels and prepare for construction of the F-35 facilities. Excavation and in situ chemical oxidation via soil mixing were identified as preferred remedial technologies; however, these alternatives presented significant technical, safety, schedule, and cost challenges. An alternate remediation strategy, in situ thermal treatment (ISTT) was selected to meet an aggressive schedule and achieve the remediation goals. However, the distribution of contaminants was not fully defined and presented significant challenges to a fast-track ISTT system design and implementation. The schedule required ISTT design and planning to proceed concurrently with a data gap investigation to finalize the target treatment zone (TTZ). Real-time observations from the DGI were integrated into a 3D model of contaminant distribution to finalize the 37,400 ft^2 and 26,400 yd^3 TTZ to complete the ISTT design. The final TTZ was 67% larger in volume and flatter in morphology than the initial design, while the max TCE concentration was 260% greater than previously known. These characteristics impacted the ISTT design, construction sequencing, power requirements, and treatment duration. Construction included 7,000 linear ft of drilling, 26,000 ft of electrical conductors, and 3,600 ft of high-temperature conveyance piping to support operation of 208 electrodes. Based on more than 60 soil confirmation samples, the maximum TCE concentration was reduced to 0.620 mg/kg, and a 95% upper confidence level of 0.038 mg/kg was achieved, allowing the facility construction to proceed on schedule. The administrative, characterization, design, construction, and operation challenges mitigated to complete the NTCRA under an aggressive and non-flexible timeline are discussed in the presentation. https://mediacdn.guidebook.com/upload/213715/PCyO9n9fZaxYUoXZ3kYQB0Dtd13yV5iG4Y9X.pdf

IN-SITU REMEDIAL DESIGN AND INTERIM REMEDIAL ACTION HAMILTON/LABREE ROADS GROUNDWATER CONTAMINATION SUPERFUND SITE CHEHALIS, WASHINGTON
Humenik, J. I DCHWS West 2024 Fall Symposium, 6-8 November, Denver, CO, 31 slides, 2024

The contamination source at the Hamilton/Labree Roads Groundwater Contamination Superfund site is thought to be from a spill or direct release of liquid PCE into Berwick Creek, causing PCE, TCE, cis-1,2-DCE, and VC contamination. An interim remedy consisted of a combined approach using in situ thermal remediation (ISTR) and enhanced anaerobic bioremediation (EAB) to achieve a 90% reduction in contaminant mass discharge from the source area. The interim remedy included managing surface water to enable ISTR and other remedial measures implemented near Berwick Creek; ISTR of soil with PCE concentrations >10 mg/kg; excavation and offsite disposal of creek bed surface soil and sediment with PCE concentrations >0.468 mg/kg; EAB groundwater treatment with PCE concentrations >4,000 µg/L; site reclamation and creek restoration after remedial activities; and long-term monitoring to evaluate performance and protectiveness of the interim remedy. The Berwick Creek channel was temporarily diverted and replaced within a temporary thermally isolated channel to protect the creek temperature and minimize disruption to fish passage. The ISTR approach combined electrical resistive heating targeting the tighter alluvium and till stratigraphies and steam-enhanced extraction to treat the highly permeable glacial outwash sands to heat and maintain the thermal treatment zone (TTZ) at the boiling point of water. It was equipped with HVE and MPE wells to aid in mass recovery and pneumatic control. The first event injected at 168 direct push points. The second EAB injection event strategically injected a combined abiotic/biotic reducing amendment and reductive dechlorinating bacteria at 34 direct push points in select areas to further remediate pockets of residual contamination. As remediation progressed, performance groundwater monitoring data were collected and evaluated to help optimize remediation during operation. The ISTR system removed 7,813 lbs of PCE from the subsurface. Post-RA mass discharge measurements confirmed that the RA achieved a >94% reduction in PCE and TCE contaminant mass discharge.
https://mediacdn.guidebook.com/upload/213715/AZ62pVsx0l4j2bkcAR5LyR85kpZmkFir4kZP.pdf

Return to top

Demonstrations / Feasibility Studies

HOT ISCO A NOVEL APPROACH TO PFAS DESTRUCTION
Bazin, A. I DCHWS West 2024 Fall Symposium, 6-8 November, Denver, CO, 25 slides, 2024

Hot In-Situ Chemical Oxidation (Hot ISCO) is an innovative, patent-pending, in-situ and ex-situ technology that destroys PFAS in soil and groundwater. It combines a small temperature rise, a metals-based catalyst, and off-the-shelf oxidant products. This methodology has been demonstrated to degrade PFAS to non-toxic end products. The technology was developed through several years of lab work, two years of field pilots, and ~34 individual lab and field trials. Hot ISCO achieved PFAS destruction efficiencies in the lab of >99.9% within method detection limits, and >90% destruction efficiency during large-volume mixed matrix ex-situ field trials. Lab and field ex-situ demonstrations across various groundwater and soil conditions, PFAS mixes, and co-contaminants have yielded a collection of lessons learned and a much deeper understanding of PFAS destruction mechanisms. https://mediacdn.guidebook.com/upload/213715/XVBE1cpjAdPWFgGyyO3IH5T3OaxricespFGH.pdf

ELECTROCHEMICALLY ASSISTED REMEDIATION OF A HIGHLY CHLORINATED ORGANIC POLLUTED SLUDGE: A FULL-SCALE CASE STUDY
Fernandez-Cascan, J., J. Isidro, B.A. Tiban-Anrango, J. Guadano, C. Saez, and M.A. Rodrigo.
Journal of Hazardous Materials Volume 480:135945(2024)

A prototype electrochemically-assisted remedial demonstration in a space environment was tested to treat a 5 × 5 m^2 plot of a leachate pond from a landfill containing dense sludge contaminated with CVOCs. Bench-scale tests (50 kg per mock-up) were initially conducted to evaluate the effects of the electric field, surfactants, and electrode materials. The bench-scale tests demonstrated the feasibility of reducing contaminant concentrations in the sludge through dehalogenation and volatilization. The average electro-osmotic flux was 0.23 cm/day, comparable to that reported for silty soils. Iron electrodes enhanced electrokinetic water transport and reduced acidification. Glassy carbon electrodes increased water volatilization, acidity near the anode, and dehalogenation of chlorinated hydrocarbons. The full-scale design and operating conditions were selected. After 590 h of operation, the total pollutant concentration was reduced by 34%, mainly due to volatilization, using a sequence of six iron-electrode arrays at 1 V/cm, which increased the sludge temperature over 60°C. An evaporation rate of 0.021 cm/d and an electro-osmotic flux of 0.62 cm/d were achieved, consistent with the bench tests. These findings demonstrate the potential of electrokinetic plants for the remediation of sludges and provide expertise applicable to future remediation at other contaminated sites.

SOLAR POWERED RECIRCULATION FOR ENHANCED REDUCTIVE DECHLORINATION PILOT TEST AT FORMER LINCOLN AIR FORCE BASE ATLAS "F" MISSILE SITE 4
Thome Jr., G. I DCHWS West 2024 Fall Symposium, 6-8 November, Denver, CO, 16 slides, 2024

A solar-powered recirculation approach that minimized system inputs and incorporated remote monitoring was used at a site to allow unattended operation. Previous pilot testing encountered vertical/horizontal distribution limitations due to low/varying permeabilities (10-4 to 10-6 cm/sec). Two 3-week pilot tests were conducted on the shallow and intermediate water-bearing zones: Configuration A was conducted by pumping two extraction wells in the intermediate zone while injecting in two wells in the shallow zone, and Configuration B by extracting from two wells in the intermediate zone and injecting in two wells within the intermediate zone. Injections were performed using gravity feed to avoid disturbing the existing transport pathways. The pilot test unit was designed so that once remediation wells were in place, the only additional inputs were emulsified vegetable oil amendment and the dye tracer. Unattended operation design and remote monitoring capabilities allowed for extending injection events at minimal additional cost. Remote monitoring of extraction well and injection well flow, process tank levels, and water levels in extraction/injection wells allowed continuous monitoring of injection progress. Low permeability of the intermediate extraction wells resulted in groundwater production rates initially insufficient to achieve maximum injection rates in shallow injection wells. Supplemental water was used for Configuration A. While total injection volumes were accurately measured, measuring flow rates to individual wells was not feasible once injection rates declined below instrument ranges. Injection rates decreased throughout the pilot test, likely due to formation pressure in the semi-confined injection zones, progressive fouling of the wells, and reduced porosity in the formation. Dye response in performance monitoring wells was erratic indicating distribution was not uniform. However, dye distribution was generally consistent with the occurrence of TCE impacts. Complete reductive dechlorination occurred in both the shallow and intermediate zones. Well spacing for full-scale operation will be based on location-specific conditions, including VOC concentrations and hydraulic testing results. https://mediacdn.guidebook.com/upload/213715/Lj9kymC1wOIZHzm2UBzpSeM4zRG6OW1NPSbF.pdf

SUPERFUND PILOT TEST RESULTS FROM A MIXED PFAS AND CHROMIUM PLUME USING COLLOIDAL CARBON AND BASE ACTIVATED SODIUM DITHIONITE
Cooper, E. I DCHWS West 2024 Fall Symposium, 6-8 November, Denver, CO, 16 slides, 2024

In addition to a soil removal interim action, EPA initiated pilot studies to finalize the remedy for Cr^{+6} and PFAS-contaminated groundwater at a former electroplating facility. A formulation for chlorinated solvents that combines collodial carbon with base activated sodium dithionite to concurrently reduce Cr^{+6} and sequester PFAS was selected for the July 2024 pilot test. The presentation covers design considerations for the pilot test, the injection approach and logs, and the post-injection groundwater results for Cr^{+6} and PFAS (primarily PFOS and PFHxS). https://mediacdn.guidebook.com/upload/213715/XTCZBDKlBT0bFIIRdBSbTDIZRHYc0Ye7Fa4U.pdf

Return to top

Research

RESEARCH BRIEF 359: USER-FRIENDLY TECHNOLOGY DETECTS NDMA IN WATER
National Institute of Environmental Health Sciences, Superfund Research Program, November 2024

A new technology, developed by researchers at the NIEHS-funded Massachusetts Institute of Technology (MIT) Superfund Research Program (SRP) Center, can detect the contaminant N-nitrosodimethylamine (NDMA) in water. This breakthrough tool offers a quick way to monitor NDMA by triggering a visible color change when light interacts with the contaminated solution. For more information, please visit
https://tools.niehs.nih.gov/srp/researchbriefs/view.cfm?Brief_ID=359

OVEREXPRESSION OF BACTERIAL Γ-GLUTAMYLCYSTEINE SYNTHETASE INCREASES TOXIC METAL(LOID)S TOLERANCE AND ACCUMULATION IN *CRAMBE ABYSSINICA*
Chhikara, S., Y. Singh, S. Long, R. Minocha, C. Musante, J.C. White and O.P. Dhankher.
Plant Cell Reports 43:270(2024)

Transgenic *Crambe abyssinica* lines that overexpress the bacterial γ-glutamylcysteine synthetase (γ-ECS) gene were developed to increase the levels of non-protein thiol peptides, such as γ-glutamylcysteine (γ-EC), glutathione (GSH), and phytochelatins (PCs), that mediate metal(loid)s detoxification. The study investigated the effect of γ-ECS overexpression on the tolerance to and accumulation of As, Cd, Pb, Hg, and Cr supplied individually or as a mixture of metals. γ-ECS transgenics (γ-ECS1-8 and γ-ECS16-5) exhibited a significantly higher capacity to tolerate and accumulate the elements in aboveground tissues (76-154% As, 200-254% Cd, 37-48% Hg, 26-69% Pb, and 39-46% Cr) when supplied individually, attributed to enhanced production of GSH (82-159% and 75-87%) and PC2 (27-33% and 37-65%) compared to WT plants under AsV and Cd exposure, respectively. The levels of Cys and γ-EC increased by 56-67% and

450-794% in the overexpression lines compared to WT plants under non-stress conditions, respectively. This likely enhanced the metabolic pathway associated with GSH biosynthesis, leading to the ultimate synthesis of PCs, which detoxify toxic metal(loid)s through chelation.

MACHINE LEARNING MODELS TO PREDICT EARLY BREAKTHROUGH OF RECALCITRANT ORGANIC MICROPOLLUTANTS IN GRANULAR ACTIVATED CARBON ADSORBERS

Koyama, Y., M.A.K. Fasaee, E.Z. Berglund and D.R.U. Knappe.
Environmental Science & Technology 58(38):17114-17124(2024)

Research aimed to develop machine learning (ML) models to predict GAC performance from adsorbent, adsorbate, and background water matrix properties. For model calibration, organic micropollutant (MP) breakthrough curves were compiled and analyzed to determine the bed volumes of water that can be treated until MP breakthrough reaches 10% of the influent MP concentration (BV10). Over 400 data points were split into training, validation, and testing sets. Seventeen variables describing MP, background water matrix, and GAC properties were explored in ML models to predict log10-transformed BV10 values. Using the ML models on the testing set, predicted BV10 values exhibited mean absolute errors of ~0.12 log units and were highly correlated with experimentally determined values ($R^2 \geq 0.88$). The top three drivers influencing BV10 predictions were the air-hexadecane partition coefficient, and hydrogen bond acidity (Abraham parameters L and A) of the MPs, and the dissolved organic carbon concentration of the GAC influent water. The model can rapidly estimate the GAC bed life, select effective GAC products for a given treatment scenario, and explore the suitability of GAC treatment for remediating emerging MPs.

ASSESSING THE ELECTRODE CONFIGURATION IN A SANDBOX SYSTEM FOR THE REMOVAL OF SULFANILAMIDE: A PILOT STUDY

Kim, J.G., H.B. Kim, M.F. Ehsan, A.N. Alshawabkeh and K. Baek.
Chemosphere 366:143392(2024)

In this study, a pilot-scale sandbox reactor was employed to simulate realistic groundwater conditions and assess the removal of sulfanilamide, a model organic contaminant. Various electrode configurations were systematically evaluated to identify key operational parameters influencing pollutant removal efficiency, providing insights for practical groundwater treatment applications. Three configurations were proposed: a single well with the anode and cathode, a double well with the separated anode and cathode, and an e-barrier with electrodes separately mounted inside a permeable barrier. Single well had the lowest removal efficiency (60%) because cathodic reaction inhibited the anodic oxidation. A double well with a separate anode and cathode can achieve 80% removal efficiency. However, effluent pH can reach up to 13.2, which can adversely impact groundwater. The e-barrier achieved complete removal and maintained a neutral pH of 7.0 over 30 days, proving to be the most effective configuration. The e-barrier energy consumption was most effective at 1.54 kWh/m^3, while the other configurations were 5.40 and 22.18 kWh/m^3. E-barriers were deemed a very reasonable configuration, both in terms of removal efficiency and practical application in groundwater.

TIME IS RIPE FOR TARGETING PER- AND POLYFLUOROALKYL SUBSTANCES-INDUCED HORMESIS: GLOBAL AQUATIC HOTSPOTS AND IMPLICATIONS FOR ECOLOGICAL RISK ASSESSMENT

Sun, T., C. Ji, F. Li, and H. Wu.
Environmental Science & Technology 58(21):9314-9327(2024)

A study illuminated the promise of hormesis as a scientific dose-response model for ecological risk assessment (ERA) of PFAS represented by PFOA and PFOS. A total of 266 hormetic dose-response relationships were recompiled from 1,237 observations, covering 30 species from nine representative taxonomic groups. The standardized hormetic amplitudes followed the log-normal probability distribution, being subject to biological plasticity limits but independent of stress inducers. The Shapley Additive Explanations algorithm revealed that the target endpoint was the most important variable explaining the hormetic amplitudes. Quantitative frameworks were established to incorporate hormesis into the predicted no-effect concentration levels, with a lower induction dose and a zero-equivalent point but a broader hormetic zone for PFOS. Realistically, 10,117 observed concentrations of PFOA and PFOS were gathered worldwide, 4% of which fell within hormetic zones, highlighting the environmental relevance of hormesis. The hormesis induction potential was also identified in other legacy and emerging PFAS and their alternatives and mixtures.

NOVEL PFAS-SPECIFIC MONITORING APPROACH FOR HIGHLY IMPACTED SURFACE WATERS

Ulrich, H., A. Macherius, U. Kunkel, M. Sengl, and T. Letzel. I Chemosphere 349:140893(2024)

A comprehensive target and non-target analysis (NTA) study was implemented for 29 months to address this deficiency and obtain in-depth information on the occurrence and temporal trend of PFAS in surface water impacted by treated industrial wastewater. Target analysis detected elevated PFAS concentrations of ≤ 10.8 µg/L in the river water. The samples were also analyzed by liquid chromatography-high-resolution tandem mass spectrometry. Data processing strategies and various filtering steps were applied to prioritize PFAS. Substances were identified by comparing data to available internal and external PFAS suspect lists, a fragment ion and neutral loss list, and spectral libraries. Several compounds were unequivocally identified based on reference standards. Fifty-five PFAS were (tentatively) identified using NTA. Of those, 43 could be assigned to 13 different homologous series. Partly fluorinated short-chain carboxylic acids (H-PFCA) and sulfonic acids (H-PFSA) were predominantly found in addition to PFCA and the alkyl ether carboxylic acid DONA. Twelve PFAS were reported in surface water for the first time. Signal intensities of individual PFAS and signal ratios varied widely over time, which may indicate batch operations leading to discontinuous emission. Results and insights from this screening approach on PFAS can be used to optimize forthcoming surface water monitoring programs by including newly identified PFAS and selecting appropriate sampling intervals.

QUALITATIVE AND QUANTITATIVE SIMULATION OF BEST MANAGEMENT PRACTICES (BMPS) FOR CONTAMINATED MEGASITE REMEDIATION USING THE SITEWISE™ TOOL

Xiao, M., X. Li, P. Seuntjens, M. Sharifi, D. Mao, J. Dong, X. Yang, and H. Zhang.
Journal of Environmental Management 360:121098(2024)

A study used the SiteWise™ tool, a quantitative environmental footprint assessment to simulate scenarios and quantify the benefits of Best Management Practices (BMPs) on a contaminated megasite in Hebei Province, China. A considerable environmental footprint and high energy usage from the remediation were observed. Taking the final implementation alternative (Alt 1) characterized by combining multiple remediation techniques as an example, greenhouse gas (GHG) emissions reached 113,474 t, the energy used was 2,082,841 million metric British thermal units (MMBTU), and other air pollutant emissions (NOx, SOx, and PM10) amounted to 856 t. Further, BMP analyses highlighted the benefits of substituting the conventional solidification/stabilization agent with willow woodchip-based biochar, which reduced GHG emissions by 50,806 t and energy used by 926,648 MMBTU. The overall environmental benefits of implementing all applicable BMPs in the remediation were significant, with reductions in GHG emissions (66.85%), energy used (50.15%), and other air pollutants (56.05%). The study offers a feasible path for quantifying the environmental benefits of BMPs, promoting the development of green and sustainable remediation of contaminated sites.

Return to top

General News

A FRAMEWORK FOR ASSESSING CLIMATE RESILIENCE AT THE DEPARTMENT OF THE NAVY'S ENVIRONMENTAL RESTORATION SITES

NAVFAC Engineering and Expeditionary Warfare Center (EXWC), Report SP-NAVFAC EXWC-SH-24001, 47 pp, 2024

This document provides a framework for assessing the effects of climate change on environmental restoration sites at the Navy's active and former installations. It describes methodologies and tools for assessing eight climate hazards to project potential impacts, vulnerabilities, and risks to the protectiveness of remedies at sites where waste remains in place, now and in the future. The eight climate hazards are coastal flooding (from sea level rise and groundwater table rise), extreme weather, riverine flooding, drought, wildfire, heat, energy demand, and land degradation.
https://exwc.navfac.navy.mil/Portals/88/Documents/EXWC/Restoration/er_pdfs/c/Climate_Framework_for_ER_Sites%20FINAL%20AUG%202024.pdf?ver=WSVpkccZsCsSIB1o0ntHvg%3d%3d

INCORPORATING MATRIX DIFFUSION IN THE NEW MODFLOW FLOW AND TRANSPORT MODEL FOR UNSTRUCTURED GRIDS USER GUIDE

Falta, R., S. Farhat, S. Panday, and A. Lemon. ESTCP Project ER19-5028, 119 pages, 2023

This effort aimed to implement the semi-analytic matrix diffusion method recently developed for the REMChlor-MD screening model in the next-generation public domain MODFLOW groundwater flow and transport codes. The matrix diffusion method used in REMChlor-MD is a semi-analytical technique based on a method originally used to model transient heat conduction during enhanced oil recovery and geothermal reservoir simulation. With some modifications, the method was demonstrated to work very well for modeling matrix diffusion in both fractured and heterogeneous systems. The semi-analytic matrix diffusion method was implemented as the MDT matrix diffusion package in the MODFLOW-USG Transport and MODFLOW 6 FORTRAN codes. The Aquaveo Groundwater Modeling System (GMS) graphical user interface has been modified to run the MODFLOW-USG Transport and MODFLOW 6 codes with the MDT package. Seven detailed tutorials have been developed to show users how to run the MDT package using GMS v.10.7 with both MODFLOW-USG and MODFLOW 6.
User's Guide: https://serdp-prod-0001-124733793621-us-gov-west-1.s3.us-gov-west-1.amazonaws.com/s3fs-public/2024-03/ER19-5028%20User%20Guide.pdf?VersionId=6Qivs1KxTFNSt_i_3Y9w8PzfyZ1rKm9.
Software: https://aquaveo.com/products.
Tutorial: https://aquaveo.com/software/gms-learning-tutorials

DYNAMIC STORAGE, RELEASE, AND ENRICHMENT OF SOME PER- AND POLYFLUOROALKYL SUBSTANCES IN THE GROUNDWATER TABLE FLUCTUATION ZONE: TRANSPORT PROCESSES REQUIRING FURTHER CONSIDERATION

Divine, C., K. Hasbrouck, B. Guo, M. Brusseau, J. Zeng, J. Wright, E. Fortner III,S. Chapman, J. Munn, B. Parker, and B. Packer. I Groundwater Monitoring & Remediation 44(4):11-20(2024)

This study highlights the dynamic processes of PFAS storage, release, and enrichment influenced by groundwater fluctuations, which play a crucial role in their transport and persistence in the environment. Key findings include:

- Storage and Release: PFAS accumulate in the unsaturated zone during low groundwater levels and are released back into groundwater during recharge events. This cyclical process influences PFAS concentrations in the aquifer.
- Enrichment Mechanisms: Specific PFAS compounds, particularly short-chain PFAS, are more mobile and can become enriched due to preferential transport and differential partitioning.
- Transport Dynamics: The interaction between hydrological events (e.g., precipitation, water table fluctuations) and PFAS physicochemical properties governs their transport, suggesting that traditional models may underestimate PFAS mobility.

The study emphasizes the need for further research to incorporate groundwater table dynamics into PFAS transport models, aiding in risk assessment and remediation strategies. It also calls for refined sampling methodologies to capture the transient nature of PFAS behavior in fluctuating groundwater systems. https://ngwa.onlinelibrary.wiley.com/doi/epdf/10.1111/gwmr.12694

PUTTING THE FLOW IN WORKFLOW: USING HYDROCARBON PLUME PREDICTION AI TO QUANTIFY GROUNDWATER RISK AND LIABILITY

Higgs, N. and S. Mamet. I 14th Annual SABCS Workshop & Conference on Contaminated Sites, 25-26 September, British Columbia, Canada, 50 slides, 2024

A new generation of contaminated site models that overcome the limitations of other models by leveraging increased data density from cost-effective IoT (Internet of Things) sensors is described in this presentation. The increased data density facilitates models that continuously calibrate, update, and improve predictability and enable adaptive management of contaminated sites. Subsurface sensors can measure temperature, pressure, humidity, CO_2, CH_4, N_2O, and petroleum hydrocarbon concentrations in soil and groundwater every 30 minutes. These sensors transmit data wirelessly via Long Range (LoRa) to gateway to cloud wireless communication technology designed for long-range, low-power communication among IoT devices. This allows models to be continually updated through highly parameterized inversion using the Parameter Estimation (PEST++) software suite. A family of artificially intelligent models that leverage the latest in modern data assimilation to quantify and reduce the uncertainty in contaminant fate and transport modeling are presented. Case studies showing real-world examples of these models and sensors, and their use in continuous monitoring and adaptive management are provided. https://sabcs.ca/wp-content/uploads/2024/10/120_Higgs_Mamet_FLOW_Final.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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