Technology Innovation News Survey

Entries for January 16-31, 2023

Market/Commercialization Information

CORNELL DUBILIER ELECTRONICS SUPERFUND SITE, OPERABLE UNIT 04 - REMEDIAL ACTION

U.S. Army Corps of Engineers, Northwestern Division, Kansas City, MO
Contract Opportunities on SAM.gov, Solicitation W912DQ23SS3001, 2023

This is a sources sought notice for marketing research purposes only under NAICS code 562910. The U.S. Army Corps of Engineers seeks to identify qualified Environmental Remediation Services firms interested and capable of providing soil and sediment remediation along Bound Brook in South Plainfield and Piscataway, New Jersey. The project will support the Cornell Dubilier Electronics (CDE) Superfund Site Operable Unit 4 Phase 4. CDE Operable Unit 4 Phase 4 -- Reaches 2, 3, and 4 involve the removal of sediment and debris from Bound Brook as well as the removal of contaminated soil (containing greater than or equal to 1 mg/kg PCBs) from the floodplains and sediment and debris from New Market Pond downstream of the former CDE facility. After soils and sediment have been removed, the nearby stream and wetlands areas will be restored and stabilized. Remediation will entail the following components: excavation of PCB-contaminated soils and debris from floodplains, wetlands, and stream sediments; dewatering of excavation areas and treatment of water; stream flow diversion; hydraulic dredging of New Market Pond; material handling and off-site disposal of multiple categories of waste; stream channel and bank restoration; and wetlands bank restoration. The project will require coordination with multiple stakeholders, including landowners, adjacent landowners, upstream landowners potentially affected by flooding, the County of Middlesex, the Borough of South Plainfield, and Piscataway Township. The value of the contract is between approximately $100M and $250M. It is anticipated that this solicitation will be published on the Federal Business Opportunities website in FY 2024. All construction is estimated to be completed by FY 2031. Responses to this sources sought notice are due by 12:00 PM CST on March 10, 2023.
https://sam.gov/opp/19b9c4a5aeec4b8191315846046571f6/view

ENVIRONMENTAL REMEDIATION SERVICES SOURCES SOUGHT (SRCSGT)

U.S. Army Corps of Engineers, Northwestern Division, Omaha District, Omaha, NE
Contract Opportunities on SAM.gov, Solicitation W9128F23SE001, 2023

This is a sources sought notice for marketing research purposes only under NAICS code 562910. The U.S. Army Corps of Engineers -- Omaha District seeks information from interested, qualified large and small [e.g., Small Businesses, 8(a), HUBZone, Small Disadvantaged Businesses (SDB), Service-Disabled Veteran-Owned Small Businesses (SDVOSB), and Women-Owned Small Businesses (WOSB)] that are capable of supporting work at hazardous toxic and radioactive waste (HTRW) sites and Munitions and Explosive Concern (MEC) sites. Services may include, but are not limited to, the assessment, inspection, investigation, study, control, characterization, containment, removal and/or treatment of environmental contamination from pollutants, toxic substances, perfluorinated compounds, radioactive materials, and hazardous materials. Environmental Remediation Services (ERS) projects include both civilian and military agencies of the Federal Government. This ERS contract will include services related to requirements of the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Environmental Protection Agency's Emerging Contaminants Program; the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Military Munitions Response Program (MMRP), the Clean Water Act, the Clean Air Act, National Environmental Policy Act (NEPA), National Historic Preservation Act, Endangered Species Act and other related Federal Programs in addition to State/Local specific regulations/requirements dealing with hazardous waste management/disposal, radioactive waste/mixed waste management/disposal, and with Underground Storage Tanks (USTs), and other fuels related issues. The number of Request for Proposals (RFPs) and dollar capacity to be awarded is undetermined at this time. Task orders are intended to be firm-fixed-price or cost-reimbursable. Task orders may range from approximately $2,500,000 to $30,000,000. Capability statements are due by 5:00 PM CDT on March 14, 2023.
https://sam.gov/opp/f4f21a632b174a28bfc0aed102682402/view

HUB ZONE SET ASIDE FOR M & H SOIL REMEDIATION (COMBINE)

U.S. Environmental Protection Agency, Region 5, Chicago, IL
Contract Opportunities on SAM.gov, Solicitation 68HE0523R0014, 2023

This is an historically underutilized business (HUBZONE) set-aside under NAICS code 562910. EPA requires a contractor to remediate 24 properties at the Matthiessen and Hegeler Zinc Company Site (the Site) in LaSalle, Illinois. The selected remedy for the Site is a residential remediation action involving the removal of source material (slag used as fill) and contaminated soil from identified properties above applicable residential or commercial/industrial human health cleanup levels. The properties will then be backfilled with imported fill and generally restored to pre-excavation conditions. Soils excavated from properties shall be excavated to the target excavation depth, as shown in the drawings from the remedial design, and staged in a stockpile at the staging area maintained by the U.S. Army Corps of Engineers (USACE) for future placement within an on-site containment cell. This placement of contaminated soil shall need to be coordinated with the USACE and its contractors. Tasks include the generation of site plans; preparation of an X-Ray Fluorescence Equipment Correlation Study; mobilization and demobilization activities; community involvement work including obtaining access and other necessary agreements, scheduling a pre-excavation walk, conducting the pre-excavation walk, and scheduling the remediation and restoration work; remediating properties; restoring properties; conducting property close-out activities; warranting work; providing data management support services; and preparing a remedial action report. The period of performance for this work will be three years from the date of award. Offers are due by 12:00 on CDT on March 15, 2023. https://sam.gov/opp/eed1f3942d2e47a29a6cc4ac2eaef06a/view

Cleanup News

IN SITU BIOGEOCHEMICAL PROCESS FOR THE TREATMENT OF CHLORINATED ORGANICS AND METALS

Leigh, D. | SMART Remediation 26 January, Toronto, 24 slides, 2023

This presentation describes the synergistic changes in geochemical conditions that occur during biochemical reduction (BGCR)-enhanced ERD and in situ chemical reduction (ISCR). Bench tests, field pilot studies, and full-scale treatment were conducted to evaluate the effectiveness of Geoform™ Extended Release and Geoform™ Soluble in treating CVOCs and sequester toxic metals. The reagents were applied at sites with distinct hydrogeologic and geochemical conditions and contaminant concentrations. Innovative analytical techniques were used to confirm the formation of and characterize the type of minerals formed. Bench tests demonstrated that BGCR enhancement significantly increased the reactivity of the ISCR reagent. The field tests demonstrated that the biologically-mediated establishment of highly reducing conditions reduced the supplied sulfate to sulfide. Analysis confirmed that sulfide combined with the supplied ferrous to rapidly generate a combination of reactive iron sulfide minerals. The combination of these technologies resulted in the rapid destruction of CVOCs and sequestration of toxic metals.
https://smartremediation.com/wp-content/uploads/2023/02/SMART-Remediation-Toronto-Daniel-Leigh-January-26-2023.pdf

CHLORINATED SOLVENT REMEDIATION AT THE PETRO-PROCESSORS SUPERFUND SITE IN LOUISIANA

Johnson, C., W.M. Moe, and P. Lee. | Pacific Northwest National Laboratory RemPlex seminar, 72 minutes, 2022

Past practices at the Petro-Processors, Inc., Superfund site north of Baton Rouge involved the waste disposal of a mixture of liquid hydrocarbons and chlorinated organics. Multiple lines of evidence (modeling, microbial characterization, pilot-scale testing) have driven groundwater remedy decision-making and regulatory approval. This seminar presents information on remediation activities at two operable units (OUs) focusing on the characterization, remedy evaluation, microbial activity identification, and implementation of permeable reactive barriers for in situ bioremediation to provide enhanced attenuation at one of the OUs. The presentation is followed by a panel discussion that explores the use of molecular biology tools in remediation and the challenges of implementing enhanced attenuation remedies in the field. https://www.youtube.com/watch?v=FxsnDw72sKQ

ONGOING CHALLENGES AND PERFORMANCE OF PULSING FOR BENZENE REMOVAL IN GROUNDWATER

Hachborn, E. | SMART Remediation 26 January, Ottawa, 23 slides, 2023

The source of a benzene release was identified in local drainage ditches adjacent to a refinery in an area known as the Third Party Pipeline Right-of-Way (ROW). The site is ~2 hectares in size and is traversed by >50 subsurface and aboveground utilities and pipelines. The density of utilities within the ROW complicated site investigations. The remedial area was divided into Stages 1 and 2. The Remedial Action Plan included a groundwater extraction and treatment system (GETS) with a geosynthetic clay liner (GCL) cap over each boundary stage area. The GETS lowered the groundwater elevations within the remedial stage boundary areas, and benzene concentrations in groundwater samples declined within the Stage 1 area. However, a pulsing plan was proposed to systemically raise the groundwater levels within the Stage 1 area to mobilize and remove any remaining benzene mass in the unsaturated zone. Pulsing would require changing the operational levels of the GETS to increase groundwater elevations while protecting the GCL and downgradient ditches. Groundwater monitoring and GETS assessment continue to be conducted regularly. Ongoing challenges and performance to date of the pulsing plan, including site hydrogeology, operations, site constraints, and the protection of infrastructure and sensitive receptors, are discussed in the presentation.
https://smartremediation.com/wp-content/uploads/2023/02/SMART-Remediation-Ottawa-Ellen-Hachborn-February-2-2023.pdf

ADVANCING IN-SITU REMEDIATION: THREE RECENT CASE STUDIES
French, K. | SMART Remediation 26 January, Ottawa, 52 slides, 2023

Real-world case studies, including site characterization data, remedial design considerations, post-remedial monitoring data, and lessons learned, are presented to illustrate how some formerly imposing remedial challenges have been overcome:

- Treatment of metal leachate/acid rock drainage (ML/ARD) plumes using pH buffering and chemically reducing permeable reactive barriers (PRBs).
- Remediation of a chlorinated solvent plume in friable, fractured bedrock that could not be accessed via either direct push tooling or pressure packer injection approaches.
- Treatment of high concentrations of petroleum hydrocarbons in soil using an engineered remedial amendment that can overcome the adsorptive capacity limitations of activated carbon.

https://smartremediation.com/wp-content/uploads/2023/02/SMART-Remediation-Ottawa-Kevin-French-February-2-2023.pdf

Demonstrations / Feasibility Studies

CODEPLOYMENT OF PASSIVE SAMPLERS AND MUSSELS REVEALS MAJOR SOURCE OF ONGOING PCB INPUTS TO THE ANACOSTIA RIVER IN WASHINGTON, DC
Lombard, N.J., M. Bokare, R. Harrison, L. Yonkos, A. Pinkney, D. Murali, and U. Ghosh.
Environmental Science & Technology 57(3):1320-1331(2023)

Passive equilibrium samplers and freshwater mussels were codeployed as dual lines of evidence to identify ongoing sources of PCBs from eight main tributaries of the Anacostia River, historically polluted from industrial and human activities. Passive samplers measured freely dissolved PCB concentrations, which tracked well with the accumulation in mussels and allowed biouptake predictions within a factor of 2 for total PCBs and a factor of 4 for most congeners. One tributary was identified as the primary source of PCBs to the water column and became a focus of additional ongoing investigations. Codeployment of passive samplers and mussels provides strong lines of evidence to refine site conceptual models and identify ongoing sources critical to control to achieve river water quality standards and reduce bioaccumulation in the aquatic food web.
https://mdsoar.org/bitstream/handle/11603/26791/acs.est.2c06646.pdf?sequence=1&isAllowed=y
Supporting information: https://mdsoar.org/bitstream/handle/11603/26791/es2c06646_si_001.pdf?sequence=4&isAllowed=y

INNOVATIVE IN-SITU REMEDIATION APPROACH TO TREAT PFAS-IMPACTED GROUNDWATER (PILOT SCALE DESIGN AND IMPLEMENTATION)
Pourabadehei, M., R. Timlin, R. Orquiza, S. Greenwood, and C. McRae.
REMTECH 2022: The Remediation Technologies Symposium, Banff, AB, Canada, 11-14 October. Environmental Services Association of Alberta, Edmonton, AB (Canada), 22 slides, 2022

AFFF use was identified as the source of PFAS contamination in soil, groundwater, surface water and sediment at a Canadian Forces Base in Ontario. The site is upgraded to a significant water body, potentially risking adverse effects on human and aquatic receptors. Therefore, an effective remediation approach was required to prevent PFAS-impacted groundwater from discharging to surface water. An innovative pilot scale in situ remediation technique consisting of an in-situ treatment train (ISTT) in the form of a "funnel and gate" permeable reactive barrier (PRB) was developed. The impermeable concrete cut-off funnel walls direct impacted groundwater toward the ISTT-PRB's high permeability treatment gate in a conventional approach. For the pilot system, the gate structure was constructed with three separate chambers running simultaneously in parallel, with each chamber containing two reactive cells running simultaneously in series. Each lead cell contains modified clay and each lag cell contains bituminous granular activated carbon, creating treatment trains. Using multiple media types enabled a wider range of PFAS to be captured than any single media. The lead and lag treatment cells each contain different but specific mixtures of media/sand. Each is monitored separately to enable assessment of the effectiveness of the different concentrations of media to treat the groundwater. The system was designed to allow removal and replacement of the media as they become exhausted, thus physically removing PFAS mass from the site and prolonging the life of the ISTT-PRB. The pilot scale system's design was completed in the summer 2021 and constructed in winter 2022. Quarterly monitoring is ongoing and expected to continue for a year. The presentation highlights the advantages of the remediation approach and the challenges encountered during the construction. Lessons learned from the construction within a hot spot of PFAS-impacted soil and groundwater are also shared.
Slides: https://esaa.org/wp-content/uploads/2022/11/RT22Pourabadehei.pdf
Longer abstract: https://esaa.org/wp-content/uploads/2022/09/RT2022-program-Abstracts-25.pdf

FIELD APPLICATION OF GLYCEROL TO ENHANCE REDUCTIVE DECHLORINATION OF CHLORINATED ETHENES AND ITS IMPACT ON MICROBIAL COMMUNITY
Czinnerova, M., V. Stejskal, K. Markova, J. Nosek, J. Riha, and A. Sevcu.
Chemosphere 309(Part 1):136640(2022)

Glycerol was applied in situ to remediate chlorinated ethenes via enhanced reductive dechlorination at a highly contaminated site. Glycerol injection resulted in an almost immediate increase in the abundance of fermentative Firmicutes, which produced essential sources of carbon (acetate) and electrons (H_2) for organohalide-respiring bacteria (OHRB) and created groundwater conditions suitable for OHRB growth. The decreased redox potential of groundwater also promoted the proliferation of sulfate-reducing bacteria, which compete for electron donors with OHRB and support their growth by producing essential corrinoids and acetate. A considerable increase in Dehalococcoides abundance, concurrently with vinyl chloride (VC) reductase gene levels, was revealed by the real-time polymerase chain reaction (qPCR) method. Consistent with the shifts in bacterial populations, the concentrations of PCE and TCE decreased during the monitoring period, with rising levels of *cis*-1,2-DCE, VC, ethene, and ethane.

PHYTOEXTRACTION OF ARSENIC, NICKEL, SELENIUM AND ZINC FROM SEWAGE SLUDGE: FROM LABORATORY TO PILOT SCALE
Salinitro, M., S. Montanari, A. Simoni, C. Ciavatta, and A. Tassoni.
Plant and Soil 481:195-212(2022)

A study verified the suitability of pure sewage sludge (SS) as growing medium for the hyperaccumulator species (*Pteris vittata*, *Odontarrhena chalcidica*, *Astragalus bisulcatus*, and *Noccaea caerulescens*), evaluated As, Ni, Se and Zn removal by the chosen species, and estimated the potential metal yields (bio-ore production) and connected monetary rewards in a small-scale field experiment. Hyperaccumulator plants were first tested under controlled conditions on three different SS (P1, P2, P3) having one or more contaminants (As, Ni, Se, and Zn). P1 sludge was then chosen for a small-scale field experiment. Hyperaccumulator seedlings were transferred on SS and cultivated for 16 weeks before harvesting. All hyperaccumulator species grew healthy on P1 SS, with *A. bisulcatus*

and *O. chalcidica* reaching an average biomass of 40.2 and 21.5 g DW/plant. Trace metal concentrations in aerial parts were: As (*P. vittata*) 380 mg/kg DW, Ni (*O. chalcidica*) 683 mg/kg DW, Se (*A. bisulcatus*) 165 mg/kg DW, Zn (*N. caerulescens*) 461 mg/kg DW. The total As, Ni, Se, and Zn removal from SS due to phytoextraction was 5.8, 19, 18, 29%, respectively. The study demonstrated that phytoextraction can be applied to SS to remove contaminants while recovering valuable metals. Se and As were identified as the most promising target element, while Ni and Zn removal was poorly efficient under the present experimental conditions.
https://link.springer.com/content/pdf/10.1007/s11104-022-05630-y.pdf?pdf=button%20sticky

Research

SIMULATION OF REGIONAL GROUNDWATER FLOW AND ADVECTIVE TRANSPORT OF PER- AND POLYFLUOROALKYL SUBSTANCES, JOINT BASE MCGUIRE-DIX-LAKEHURST AND VICINITY, NEW JERSEY, 2018

U.S. Geological Survey, Fiore, A.R. and S.J. Colarullo. U.S. Geological Survey Open-File Report 2022-1112, 56 pp, 2023

A three-dimensional numerical groundwater flow model was developed and calibrated for the unconsolidated New Jersey Coastal Plain aquifers underlying Joint Base McGuire-Dix-Lakehurst (JBMDL) and the vicinity to evaluate groundwater flow pathways of PFAS contamination associated with AFFF use at the base. The regional subsurface flow model spans an area of ~518 mi ^{2} around JBMDL based on a hydrogeologic framework of the area. Steady-state flow in the unconsolidated aquifers was simulated using the MODFLOW 6 groundwater flow model to account for hydrostratigraphic pinchouts and discontinuities in the underlying aquifers. The grid was refined using quadtree meshes spanning 21 areas with historical AFFF use to account for local patterns of fluid flow driving advective subsurface migration of PFAS. Five offsite areas were identified where PFAS occurrence is most likely to pose a potential danger to local drinking water supplies and along streams that behave as drains in the base-flow-dominated Coastal Plain. The coupled and calibrated groundwater flow and particle-tracking transport model provide valuable tools for predicting the relative extent of PFAS contamination from onsite legacy source areas. The calibrated model also provides measures of water-level and base-flow observation influence that can help guide future data-collection efforts related to groundwater and surface water sampling for PFAS.
https://pubs.usgs.gov/of/2022/1112/ofr20221112.pdf

PILOT-SCALE BIOFILTRATION OF 1,4-DIOXANE AT DRINKING WATER-RELEVANT CONCENTRATIONS

McElroy, A.C., M.E. Ogles, M.R. Hyman, and D.R.U. Knappe.
Water Research 231:119652(2023)

A gravity-fed, cometabolic biofiltration system was developed to degrade 1,4-dioxane spiked into coagulated, settled surface water at a concentration of ~10 µg/L. Objectives were to determine whether cometabolic degradation of trace levels of 1,4-dioxane can be sustained using n-butane as the primary substrate and whether filter media properties and empty bed contact time (EBCT) affect biofiltration efficiency. A mixed culture of bacteria derived from the Cape Fear River basin, previously enriched using isobutane, served as inoculum for biologically active filters. Two granular activated carbons (GACs) with different grain sizes and one carbonaceous resin were used as attachment media, and n-butane served as the primary substrate for biologically active filters. Non-inoculated controls with the same media were evaluated in parallel to distinguish between biological and adsorptive removals of 1,4-dioxane. Over the >3-month study, 1,4-dioxane was degraded in inoculated biofilters receiving n-butane. In control filters containing larger and smaller grain GAC, 1,4-dioxane broke through completely within 750 and 1,250 bed volumes, corresponding to 15 to 30 days of operation at an EBCT of 30 min. Removal of 1-4 dioxane increased with increasing EBCT in all biologically active filters. At an EBCT of 30 min, the biologically active GAC filter containing the larger-grain GAC removed 87% (average) of 1,4-dioxane at pseudo steady state. When the hydraulic loading rate was decreased to achieve an overall EBCT of 60 min, 1,4-dioxane was removed to

CARBON INJECTION TO SUPPORT IN-SITU SMOLDERING REMEDIATION

Wilton, G.M., J.I. Gerhard, and D.W. Major. I Remediation 33(1):39-51(2022)

A study investigated using carbon injection to support Self-Sustaining Treatment for Active Remediation (STAR) to treat PFAS. Four solutions were used: (1) 17% colloidal activated carbon (CAC); (2) 23% CAC; (3) 17% powdered activated carbon (PAC); and (4) 23% PAC. Smoldering temperatures greater than the required PFAS destruction temperature were reached 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 when supplied at a quantity less than or equal to carbon microparticles. Findings provide the necessary intermediate lab work to evaluate methods to achieve PFAS treatment through STAR when applied in the field.

A NOVEL STRATEGY FOR ENHANCING BIOREMEDIATION OF POLYCHLORINATED BIPHENYL-CONTAMINATED SOIL WITH RESUSCITATION PROMOTING FACTOR AND RESUSCITATED STRAIN

Zhou, X., S. Zhang, R. Wang, Z. An, F. Sun, C. Shen, H. Lin, and X. Su.
Journal of Hazardous Materials 447:130781(2023)

A study was conducted to assess the feasibility of supplementing the resuscitation promoting factor (Rpf) (SR) or resuscitated strain LS1 (SL), or both (SRL) for enhanced bioremediation of PCB-contaminated soil. Results indicated that Rpf and/or LS1 amended soil microcosms rapidly degraded PCBs (1.1-3.2 times faster) than control microcosms. Although soil-inoculated LS1 maintained the PCB-degrading activity, higher degradation of PCBs was observed in Rpf-amended soil microcosms than SL. The order of enhancement effect on PCBs bioremediation was SRL > SR > SL. PCBs degradation in soil microcosms occurred via HOPDA-benzoate-catechol/protocatechuate pathways. The improved PCBs degradation in Rpf-amended soil microcosms was attributed to the enhanced abundances of PCB-degrading populations, mainly Proteobacteria and Actinobacteria. Results suggest that Rpf and resuscitated strains serve as effective additives and bio-inoculant for enhanced bioremediation.

GEOGRAPHIC AND DEMOGRAPHIC VARIABILITY IN SERUM PFAS CONCENTRATIONS FOR PREGNANT WOMEN IN THE UNITED STATES

DeLuca, N.M., K. Thomas, A. Mullikin, R. Slover, L.W. Stanek, A.N. Pilant, and E.A.C. Hubal.
Journal of Exposure Science & Environmental Epidemiology(2023)

The aim of this study was to better understand maternal and early-life exposures to PFAS from various potential sources and pathways in the context of household and community-level characteristics. PFAS data from the National Children's Study (NCS) Vanguard Data and Sample Archive Access System were analyzed from the serum of 427 pregnant women in seven counties throughout the U.S. Location and self-reported questionnaire responses were used to analyze variability in serum concentrations based on demographics, housing characteristics, behaviors, and geography. Spatial mapping analyses incorporated publicly available data to further hypothesize potential sources of exposure in two NCS counties. Location was associated with serum concentrations for all PFAS chemicals measured. Questionnaire responses for race/ethnicity, income, education level, number of household members, drinking water source, home age, and fast-food consumption were associated with PFAS levels. Statistical differences were observed between participants with the same questionnaire responses but in different locations. Spatial mapping analyses suggested that proximity to local point sources can overshadow expected trends with demographic information. This work increases understanding of maternal and early-life PFAS exposures, reveals environmental justice considerations, and contributes to study design and risk management strategies. *This article is* ***Open Access*** *at*https://www.nature.com/articles/s41370-023-00520-6.

LONGEVITY OF COLLOIDAL ACTIVATED CARBON FOR IN SITU PFAS REMEDIATION AT AFFF-CONTAMINATED AIRPORT SITES

Carey, G.R., S.G. Hakimabadi, M. Singh, R. McGregor, C. Woodfield, P.J. Van Geel, and A. Le-Tuan Pham. I Remediation 33(1):3-23(2022)

An analysis of 17 field-scale studies of colloidal activated carbon (CAC) injection at PFAS sites showed that in situ CAC injection was generally successful in remediating both short- and long-chain PFAS in the short-term (0.3-6 years), even in the presence of low levels of organic co-contaminants. Freundlich isotherms were determined under competitive sorption conditions using an AFFF-impacted groundwater sample. The median concentrations for PFAS of interest at 96 AFFF-impacted sites were used to estimate influent concentrations for a CAC longevity model sensitivity analysis. CAC longevity estimates were insensitive to a wide range of potential cleanup criteria based on modeled conditions. PFOS had the greatest longevity although PFOS is present at

higher concentrations than the other species because the CAC sorption affinity for PFOS is considerably higher than PFOA and PFHxS. Longevity estimates were directly proportional to the CAC fraction in soil and the Freundlich Kf, and were inversely proportional to the influent concentration and average groundwater velocity. https://onlinelibrary.wiley.com/doi/epdf/10.1002/rem.21741

General News

A TOOL FOR FORECASTING THE ARRIVAL TIME OF A TRACER OR A POLLUTANT AT A KARST SPRING

Preisig, G. and L. Perrochet. | Groundwater 61(1):111-118(2023)

This article introduces a straightforward method to forecast the arrival time of a tracer or a pollutant at a karst spring. The approach is based on repeated tracer testing, gauging spring flow rate, and mathematical curve fitting. Tracer tests and gauging spring flow rates were repeated under low, middle, and high flow periods. Arrival times of the tracer from a given swallow hole of the network were plotted as a function of measured flow rates at the karst spring and a mathematical function was used to fit the observational data. Flow rate monitoring at high-temporal resolution at the karst spring and the mathematical functions allow forecasting the arrival of a tracer or a pollutant at the spring in the case of an accident involving a swallow hole of the network or estimating the duration of pollution if hydrodynamic conditions do not change abruptly. Case studies of three sites in Switzerland are presented to document the applicability of the method. https://ngwa.onlinelibrary.wiley.com/doi/epdf/10.1111/gwat.13218

HYDROCARBONS TRAINING: EFFECTIVE APPLICATION OF ITRC GUIDANCE DOCUMENTS

Interstate Technology & Regulatory Council (ITRC) Hydrocarbons Training Team web-based training, hyd-1, 2023

ITRC's Hydrocarbons Training Team, Effective Application of Guidance Documents to Hydrocarbons Sites, has developed new tools and training to address data gaps from reviewing multiple source files on this topic. This training builds upon the information presented in three popular ITRC Guidance Documents: Light Non-Aqueous Phase Liquid (LNAPL), Petroleum Vapor Intrusion (PVI), and Total Petroleum Hydrocarbon (TPH) Risk Evaluation. *View guidance documents at* https://hyd-1.itrcweb.org/

MICROPLASTICS

Interstate Technology & Regulatory Council (ITRC), Web-based document MP-1, 2023

Microplastics (MP) are ubiquitous in our environment and pose one of the biggest emerging threats to the global environmental community. The science surrounding MP, their potential health effects, and knowledge of their fate and transport is very new and ongoing, with research articles being published at a rapidly accelerating rate. Even techniques and best practices for sample collection and analysis of these tiny particles and fibers are still very much evolving. ITRC's Microplastics Team has synthesized the available information on MP into a single comprehensive guidance document, covering everything from ecological effects and mitigation and abatement strategies to environmental distribution! Along with the document, the Microplastics Team has developed a 2-hour Internet-based training, offered live on a quarterly basis starting in March 2023, with recordings available on the ITRC website. https://mp-1.itrcweb.org/ For upcoming trainings, see either *https://itrcweb.org/events/calendar or https://clu-in.org/training/#upcoming*

ENVIRONMENTAL BEHAVIOR AND REMEDIATION OF CONTAMINATED SITES WITH CATIONIC RADIONUCLIDES: THE CASES OF CS AND SR

Onda, Y., D.I. Kaplan, and J. Szecsody. | Pacific Northwest National Laboratory RemPlex seminar, 90 minutes, 2023

The speakers discussed the current understanding of Cs and Sr behavior in complex contaminated sites, including experimental, modeling, and monitoring data on the deposition, distribution, fate, and transport of these radionuclides; the role of permeable reactive barriers; and emerging remediation strategies for cationic radionuclides under different environmental conditions.
https://www.pnnl.gov/projects/remplex/seminars/cationic-radionuclides-cases-cs-and-sr

A GEOPHYSICAL REMEDIATION MONITORING METHOD SELECTION TOOL (GRM-MST)

Thompson, J., A. Mangel, and F.D. Day-Lewis.
Groundwater 16(1):8-10(2023)

This article provides an overview of the GRM-MST, which helps practitioners identify a geophysical method to monitor remediation operations based on the remediation method being used and site characteristics. The target audience for the tool is environmental professionals with some exposure to geophysics but not necessarily formal coursework or training. To apply the GRM-MST, the user identifies site remedies to be monitored; the remedies represent proven candidates for geophysical monitoring based on past research. Performance monitoring goals can include monitoring the spatial distribution of emplaced or injected amendments, assessing flow through permeable reactive barriers, checking for flow through caps or impermeable barriers, tracking biogeochemical signatures associated with contaminant degradation processes, or monitoring the progress of soil desiccation. The user then enters information about the site conditions, including the presence of subsurface infrastructure, whether it is possible to disturb the ground, and whether the GPS signal is impacted by tree canopy. Based on user input, the tool assesses the viability of ninegeophysical methods that could potentially contribute to achieving site goals. Ideally, premodeling "desktop feasibility" experiments would be used to further assess the geophysical method before field use. Geophysical methods can fill gaps in space and time between more direct measurements or sampling and support more cost-effective performance monitoring. *Link to tool:*
https://ngwa.onlinelibrary.wiley.com/action/downloadSupplement?doi=10.1111%2Fgwat.13268&file=gwat13268-sup-0001-Supinfo.xlsx

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

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