# **Technology Innovation News Survey**

# Entries for August 1-15, 2024

#### **Market/Commercialization Information**

# F -- \$249M IDIQ MATOC FOR ENVIRONMENTAL REMEDIATION SERVICES (ERS) - SMALL BUSINESS (SB) SET-ASIDE (SOL)

U.S. Army Corps of Engineers, Omaha District, Omaha, NE Contract Opportunities on SAM.gov W9128F24R0012, 2024

This is a total small business set-aside under NAICS code 562910. The U.S. Army Corps of Engineers, Omaha District, requires a contractor to provide Environmental Remediation Services (ERS) at hazardous toxic and radioactive waste (HTRW) sites and Munitions and Explosive Concern (MEC) sites. Services may include 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. RSP projects include both civilian and military agencies of the Federal Government. This contract will include services related to requirements of RCRA, CRECLA, the EPA Emerging Contaminant Program; the National Oil and Hazardous Substances Pollution Contingency Plan, Military Munitions Response Program, the Clean Water Act, the Clean Air Act, National Environmental Policy Act, 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, and other fuels related issues. The ERS activities include preliminary assessments, site inspections, remedial investigations, feasibility studies, remedial designs, and site remedilation including excavation/removal of contaminates As part of any site remediation activities, construction of treatment systems. The ERS actions may address both regulated and non-regulated toxic substances and emerging contaminants. As part of any site remediation activities, construction (i.e., treatment plant construction, potable ware hook-ups, temporary site stabilization, drainage modifications, etc.) may also be included in this contract. MIATOC

#### FY25 GUIDELINES FOR BROWNFIELD ASSESSMENT GRANTS (COMMUNITY-WIDE ASSESSMENT GRANTS FOR STATES AND TRIBES) Environmental Protection Agency, Funding Opportunities, 2024

EPA's Brownfields Program provides funds to empower states, communities, tribes, and nonprofit organizations to prevent, inventory, assess, clean up, and reuse brownfield sites. The closing date for applications for all of these opportunities is November 14, 2024.

- EPA-I-OLEM-OBLR-24-09: FY25 Guidelines for Brownfields Assessment Grants (Community-Wide Assessment Grants for States and Tribes). EPA anticipates 18 awards for brownfield assessment out of total estimated program funding of \$36M. <a href="https://grants.gov/search-results-detail/356304">https://grants.gov/search-results-detail/356304</a>. • EPA-I-OLEM-OBLR-24-11: FY25 Guidelines for Brownfield Cleanup Grants. EPA anticipates 63 awards for brownfield cleanup out of total estimated program funding of \$100M. https://grants.gov/search-results-detail/256306
- EPA-OLEM-OBLR-24-08: FY25 Guidelines for Brownfield Assessment Grants (Community-Wide Assessment Grants). EPA anticipates 92 awards for brownfields assessments out of total estimated program funding of \$46M. <u>https://grants.gov/search-results-detail/356303</u>. EPA-I-OLEM-OBLR-24-10: FY24 FY25 Guidelines for Brownfield Revolving Loan Fund grants. EPA anticipates 15 awards for brownfield cleanup out of total estimated program funding of \$15M. <u>https://grants.gov/search-results-detail/356305</u>.
- EPA-OLEM-OBLR-24-07: FY25 Guidelines for Brownfield Assessment Grants (Assessment Coalition Grants). EPA anticipates 29 awards for brownfield cleanup out of total estimated program funding of \$35M. https://grants.gov/search-results-detail/356301

#### DEVELOPING AND DEMONSTRATING NANOSENSOR TECHNOLOGY TO DETECT, MONITOR, AND DEGRADE POLLUTANTS Environmental Protection Agency, Funding Opportunity EPA-G2024-STAR-G1, 2024

This funding opportunity is soliciting research to develop and demonstrate nanosensor technology with functionalized catalysts that have the potential to degrade selected contaminants in addition to detecting and monitoring pollutants. Specifically, EPA is seeking proposals that use nanotechnology to detect, monitor, and degrade PFAS in groundwater or surface water that may be used as drinking water sources. The Science to Achieve Results (STAR) Program's goal is to stimulate and support scientific and engineering research that advances EPA's motion to protect human health and the environment. It is a competitive, peer-reviewed, extramural research program that provides access to the nation's best scientists and engineers in academic and other nonprofit research institutions. STAR funds research on the environmental and public health effects of air quality, environmental changes, water quality, hazardous waste, toxic conversation by including members of communities which may have not previously participated in such dialogues to participate in EPA programs. For this reason, EPA strongly encourages all eligible applicants identified in Section III, including minority-serving institutions, to apply under this opportunity. <u>https://grants.gov/search-results-detail/355752</u>

#### **Cleanup News**

UNDERSTANDING THE DYNAMICS OF ENHANCED LIGHT NON-AQUEOUS PHASE LIQUIDS (LNAPL) REMEDIATION AT A POLLUTED SITE: INSIGHTS FROM HYDROGEOPHYSICAL FINDINGS AND CHEMICAL EVIDENCE Ciampi, P., G. Cassiani, G.P. Deidda, C. Esposito, P. Rizzetto, A. Pizzi, and M.P. Papini. Science of The Total Environment 532:172934(2024)

An innovative technology combining ISCO and enhanced desorption was applied at a petroleum hydrocarbon-contaminated site to treat residual LNAPL and enhance the effectiveness of groundwater extraction and the treatment systems. The enhanced remediation system included reagent injections of PetroCleanze® (a desorbent) and RegenOx® (an oxidizer) into the subsurface to stimulate the desorption of oxidation of residual hydrocarbons, mobilizing them for subsequent extraction, Re-lines absurface dynamics were investigated through geophysical monitoring, employing electrical resistivity tomography (ERT) to trace reagent migration pathways via their effect on bulk electrical conductivity. Integrating groundwater sampling data aimed to provide additional insights into the transformations of contaminants in the spatiotemporal context. Vivid 2D time-lapse ERT sections showcased the evolution of resistivity mobilization processes with increasing groundwater concentrations of contaminants in the spatiotemporal context. Vivid 2D time-lapse ERT sections showcased the evolution of resistivity understanding of spatial and temporal physic-chemical changes during the ermediation process. Sec with increasing data and technical analyses revealed effective contaminants following the sequence of product injection and the push and pull activities, capturing the ennoval of mobilized contaminants through hydraulic barrier wells. This enhanced understanding proves instrumental in optimizing and tailoring remediation efforts, especially in hetergoeneous environmenta settings. https://www.sciencedirert.com/science/article/pii/S004896972403081X/pdfft2md5=Zf8bd852bdc9abe94609440d9472dae68pid=1-s2.0-S004896972403081X-main.pdf

#### PFAS TREATMENT OPTIONS

Speth, T., S. Burden, J. Burkhardt, N. Dugan, L. Haupert, P. Jordan, R. Khera, T. Lee, M. Nadagouda, J. Pressman, P. Ransom, E. Tow, M. Ersan, S. Kum, C. Owen, C. Bellona, A. Mikelonis, P. Westerhoff, C. Mysore, V. Frenkel, V. deSilva, S. Walker, A. Safulko, and D. Ladner. I PFAS Treatment Options. 104th Annual Water & Wastewater Operators School & Certification Examinations, Lawrence, KS, 1-2 August, 63 slides, 2024.

This presentation describes EPA's PFA's research and their technical assistance project to sample full- or pilot-scale PFA's treatment facilities over extended periods of time to define capital and operating costs as well as removal performance across a range of water qualities. The program aims to identify sustainable and cost-effective treatment strategies for PFA's and emerging contaminants and disseminate the results nationally. Ultimately, the goal is to optimize treatment approaches and develop a national database of information from ~40 systems that all utilities can use to gain knowledge on treatment approaches and residual management practices. https://cfpub.epa.gov/si/si\_public\_file\_download\_cfm2p\_download\_id=54962381ab=CFSFR

#### LARGE-SCALE IN SITU REDUCTIVE DECHLORINATION OF GROUNDWATER IMPACTED WITH COMMINGLED TCE AND HEXAVALENT CHROMIUM IN ISRAEL Mejac, M.M. | Battelle 2024 Chlorinated Conference, 2-6 June, Denver, CO, 19 slides, 2024

Groundwater remediation using enhanced in situ anaerobic bioremediation (ISB) paired with in situ chemical reduction (ISCR) was implemented to address cVOC and Cr(VI) contamination at a ~6-acre industrial site. Subsurface investigations identified the presence of cVOCs in groundwater (TCE \$ 97,300 µg/L). and PCE concentrations \$ 5.380 µg/L). Cr(VI) was also detected at concentrations up to 59, 100 µg/L. Substantial heterogeneities within the treatment zone posed significant challenges to effectively distribute injected memdments. The full-scale injection design, was based on estimated hydrogen equivalents for complete electron acceptor consumption. Overall, 42,500 lbs of organic carbon substrate and 660 lbs of a soluble forn substrate were injected. Post-injection wells; a total of 280,000 gals of fluid were injected, targeting ~75% of the available aquifer pore space. Once the onset of anaerobic conditions was confirmed. (71 L of decklorinating culture were injected. Post-injection mells; a total of 280,000 gals of fluid were injected, targeting ~75% of the oncentrations and molar fractions. Cet decreased by 84%, from 1.601 µg/L to 251 µg/L and Cr(VI) decreased by 96%, from 4.030 µg/L to 251 µg/L, there contration based on evaluation of cucyclos and on valuation of cucyclos and on evaluation of cucyclos and on attrate, and rationales regarding proposed deep groundwater treatment injection approaches and next steps. https://cardemy.s3.amazonaws.com/battelle/2024. Chlorinater/14.04.253. Mejac.onfi

#### **Demonstrations / Feasibility Studies**

THE REPRESENTATIVENESS OF SUBSLAB SOIL GAS COLLECTION AS EFFECTED BY PROBE CONSTRUCTION AND SAMPLING METHODS Zimmerman, J.H., A. Williams, B. Schumacher, C. Lutes, L. Levy, G. Buckley, V. Boyd, C. Holton, T. McAlary, and R. Truesdale. Groundwater Monitoring & Remediation 44(3): 106-121(2024)

Subslab soil gas (SSSG) samples were collected as part of an investigation to evaluate vapor intrusion (VI) into a building and will be used to provide input into future OSWER VI Guidance documents on SSSG sample collection, as the June 2015 OSWER VI Guide does not provide specific, detailed recommendations regarding how to collect SSSG samples. Three different subslab sampling port types were constructed with various sampling techniques within a hexagon-shaped grid near each other. Conventional, Vapor Pin-, and California-style ports were established in duplicate for continual analysis by onsite gas chromated graphy-electron capture detection. Triplicate ports were established to evaluate active and passive long-term sampling methods to determine short-range temporal differences. Active sampling methods included evacuated starihese-steel canisters fitted with capillary flow controllers and sorbent tubes collected using a syringe. Samples were analyzed using EPA TO-17 (Modified) using sorbent tube samplers as the passive sampling method. No systematic differences in sample results between conventional, Vapor Pin, and CA-style probes used in SSSG sampling were identified. Site management decisions would likely be the same for data from any subslab port style, active or passive sampling techniques over durations less than 2 weeks.

PILOT STUDY OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) INFILTRATION TO SHALLOW GROUNDWATER THROUGH SELECTED SOILS IN NEW HAMPSHIRE, 2023 Meadows, M.C., Welch, S.M., Tokranov, A.K., and T.A. Lincoln. U.S. Geological Survey (USGS) data release, published December 27, 2023

In a study conducted by USGS and the New Hampshire Department of Environmental Services, detectable PFAS concentrations were found in the soil at all sites despite targeting locations with no known PFAS sources (see <u>https://www.sciencehase.gov/catalog/item/5114346c72189hb0r4</u>). As a result, USGS implemented a pilot study to evaluate whether PFAS infiltrat through shallow soil into shallow groundwater. Five sites were selected based on previously observed PFAS concentrations, soil type, aquifer materials, selevation, groundwater depth, and geographic location (see <u>https://www.sciencehase.gov/catalog/item/5114346c734e622189hbbrc4</u>). At each site, one pushpoint sampler was installed down-slope of new soil sample points. At one sample site, two stainless steel lysimeters were installed at two varying depths above the water table, and up-slope of the pushpoint sampler. Seven shallow soil samples were submitted for PFAS, total organic carbon, and pH analysis. Twelve groundwater samples and four porewater samples were also submitted for PFAS analysis.

# PERFORMANCE COMPARISON OF THREE PASSIVE SAMPLERS FOR MONITORING OF POLAR ORGANIC CONTAMINANTS IN TREATED MUNICIPAL WASTEWATER Fialova, P., K. Sverclova, K. Grabicova, R. Grabic, H. Svecova, P. Novakova, and B. Vrana Science of The Total Environment 908:168153(2024)

A study compared the performance of three samplers: the Polar Organic Chemical Integrative Sampler (POCIS), the Hydrogel-based Passive Sampler (HPS, an upscaled version of o-DGT), and the Speedisk, on a diverse suite of pharmaceuticals, PFAS, and pesticides and their metabolites. The samplers were deployed side-by-side in the treated effluent of a municipal wastewater treatment plant for different exposure times. All samplers accumulated a comparable number of compounds. Integrative uptake was observed for most compounds detected up to 28 days for POCIS, up to 14 days for HPS, and up to 42 days for Speedisk. In the integrative uptake phase, consistent surface-specific uptake was observed with a significant correlation between samplers (r ≥ 0.76) despite differences in sampler construction, diffusion barrier, and sorbent material used. The low sampling rates compared to the literature and the low estimated overall mass transfer coefficient suggest that the water boundary layer was the main barrier controlling the uptake for all samplers. Although all devices provided comparable performance, Speedisk overcomes POCIS and HPS in several criteria, including time-integrative sampling over a long period and physical durability.

#### DESIGN AND INSTALLATION OF A PILOT-SCALE PHYTOREMEDIATION SYSTEM FOR PESTICIDES IN GROUNDWATER, WEST COLUMBIA, SOUTH CAROLINA Landmeyer, J. I Clemson Hydrogeology Symposium, 28 March, Clemson SC, abstract only, 2024

A pilot-scale remediation system comprised of 200 hybrid poplar trees was designed and implemented to evaluate whether the trees would decrease pesticide concentrations in groundwater at a site near West Columbia, South Carolina. Toxaphene and beta-benzene hexachloride (β-BHC) concentrations were highest near the pesticide source area and decreased in the direction of groundwater flow toward a small creek. Pesticide concentrations in groundwater near the creek were much lower than anticipated. For example, the average decrease of Iotal pesticides in groundwater near the creek was 22 times more than expected, respected, respected,

#### Research

ENHANCING REMEDIATION OF RESIDUAL DNAPL IN MULTILAYER AQUIFERS: POST-INJECTION OF ALCOHOL-SURFACTANT-POLYMER MIXTURES Alamoti, A. S. Colombaro, A. Shoker, A. Ahmadi-Senichault, F. Lion, D. Cazaux, C. Marion, J. Lagron, I. Sawadogo, and D. Davarzar Science of The Total Environment 918:170680(2024)

Science of the focial convioninent 91617/000(2024) A study evaluated the efficiency of post-injection of alcohol-surfactant-polymer (ASP) mixtures containing 1-propanol/1-hexanol, sodium dodecylbenzenesulfonate (SDBS), and xanthan in enhancing residual DNAPL remediation in layered systems. Experimental devices employed included batch, rheological measurements, centimetric 1D column, and decametric 2D tank experiments. Batch experiments revealed that the inclusion of 1-hexanol swelled the DNAPL volume due to alcohol partitioning. Conversely, with only 1-propanol present in the alcohol-surfactant (AS) mixture, DNAPL dissolved in the aqueous phase. The co-presence of 1-hexanol and 1-propanol in the 4S mixture favored 1-propanol's partitioning into the DNAPL volume due to alcohol partitioning. Conversely, with only 1-propanol spartitioning into the DNAPL dissolved in the aqueous phase. The co-presence of 1-hexanol and 1-propanol in the 4S mixture favored 1-propanol spartitioning into the DNAPL phase. Following primary xanthan-SDBS (XS) injections, column experiments demonstrated that ASP mixtures with 1-hexanol (regardless of the presence of 1-propanol) underwent a mobilization mechanism. DNAPL appeared in the effluent in the organic phase after post-injection of 0.3 pore-volumes (PV), noted by a reduction trend in its density. Mixtures with only 1-propanol exhibited a solubilization mechanism, with DNAPL dissolving in the aqueous phase and empring in the effluent after ~1 PV. 2D tank experiments visualized mobilization and solubilization mechanisms in multilayered systems. Post-injection of the ASP mixture with 1-propanol and 1-hexanol mobilized sould by a dark zone of varied DNAPL dissolvition. Injecting an ASP mixture containing 1-propanol and 1-hexanol mobilized soulen DNAPL ganglia throughout layers, with droplets coalescing and migrating to the recovery point. The darkness of mobilized droplets faded as more DNAPL was recovered. The solubilization ASP mixture enhanced the recovery factor by 0.02, while the mo

## PER- AND POLYFLUOROALKYL SUBSTANCES IN FOOD PACKAGING: MIGRATION, TOXICITY, AND MANAGEMENT STRATEGIES Phelps, D.W., L.V. Parkinson, J.M. Boucher, J. Muncke, and B. Geueke. Environmental Science & Technology 58(13):5670-5684(2024)

A study systematically mapped the evidence of PFAS detected in migrates and extracts of food contact materials and provided an overview of available hazard and biomonitoring data. Based on the FCCmigex database, 68 PFAS were identified in various food contact materials, including paper, plastic, and coated metal, by targeted and untargeted analyses, 87% belonging to the PFCAs and fluorotelomer-based compounds. Chain length trends demonstrated that long-chain PFAs continue to be found despite years of global efforts to reduce the use of these substances. ToxPI was utilized to illustrate that hazard data are available for only 57% of the PFAS detected in food packaging. Many adverse outcomes have been reported for the PFAS for which toxicity testing has been performed. The data and knowledge gaps identified in this study support interminational proposals to restrict PFAS, including in food contact marials, to protect human and nvironmental health

#### STUDY ON THE GAS PHASE MIGRATION AND DISTRIBUTION CHARACTERISTICS IN HORIZONTAL WELL AIR SPARGING REMEDIATION

Zhang, X., B. Liang, Z. Wu, L. Tang, L. Zeng, and D. Wu. Environmental Technology & Innovation 34:103583(2024)

A study employed model experiments and numerical simulations to investigate the distribution patterns of lateral airflow in horizontal air sparging tubes within a porous medium. The influence of parameters such as air sparging pressure, groundwater flow, the inclination angle of the air sparging tubes, and the diameter of the medium particles on the distribution patterns of gas-phase transport in horizontal well air sparging (AS) were analyzed. Results showed that groundwater flow and the inclination arging tubes disrupt the uniformity of gas distribution. The zone of influence (ZOI) area of AS was observed as an oblong shape in the horizontal plane and a parabolic contour along the boundaries. In addition, a mutual influence was identified between groundwater flow and has airflow. The inclination of air sparging tubes results in the formation of preferential flow near the air source end. The ZOI of horizontal AS demonstrates a positive correlation with air sparging pressure and a negative correlation with medium particle diameter.

### FORMERLY USED DEFENSE SITES ON UNALASKA ISLAND, ALASKA: MAPPING A LEGACY OF ENVIRONMENTAL POLLUTION

Jordan-Ward, R., F.A. von Hippel, J. Schmidt, and M.P. Verhougstraete. Integrated Environmental Assessment and Management 20(5):1420-1431(2024)

The goals of this study were to identify hotspots of contamination remaining at Unalaska formerly used defense (FUD) sites, evaluate the risk posed by arsenic, and examine "no US Department of Defense action indicated" (NDAI) status determinations for FUD sites near communities. Soil chemistry data was compiled from remediation reports at 18 FUD sites on and near Unalaska: 9 had past and/or active remediation projects and on osite sampling data a, 8 did not have sampling data and were characterized as NDAI, and 1 site was listed as closed. For the 9 sites vith sampling data, 22 contaminants of concern (COCs) were compiled, and concentrations were compared to soil cleanup levels for human health. Contaminant concentrations exceeding these levels were mapped to identify hotspots. Some concentrations of the 22 COC exceeded Alaska cleanup levels despite remediation efforts, including diesel range organics, arsenic, and lead. The highest COC concentrations were at the FUD site adjacent to the City of Unalaska: A quantitative risk assessment for arsenic found that the risk of exposure through drinking water is low. The article highlights concerns with NDAI designations and current remediation repute FUD sites adjacent to communities. Data suggest further remediation and monitoring efforts for certain contaminants and research to examine potential threats to human and animal health associated with these sites.

#### DATA-DRIVEN INSIGHTS INTO THE CONTAMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN MARINE BAYS

Liu, D., Y. Luo, W.-H. Bao, M. Junaid, Z.-F. Guo, and Y.-Y. Xu. Environmental Science & Technology 58(34):15202-15213(2024)

A data synthesis framework was developed to gain insights into the spatiotemporal patterns, compositional profiles, and potential sources of PAHs in water and sediment of marine bays. PAHs were detected in 69 bays worldwide, with contamination hotspots located in Asian bays. PAH concentrations in pre-2000 were significantly lower than those in the 2000s and post-2010, while the dominant species in water and sediment were 2-3 ring and 4-6 ring PAHs, respectively. The composition patterns of PAHs included 2-3 ring, 3-5 ring, and 4-5 ring dominant categories, but no significant distance decay relationship was found in the composition patterns of value to international energy trade. Temporal dynamic patterns of concentrations included Descending-, Ascending-, and Inverted V-type, whereas over longer time spans, the pattern is more similar to the Inverted V-type owing to the reductions in emission intensity. PAHs were found to be derived from petrogenic and pyrolytic sources, with combustion from coal and petroleum being the dominant sources. These data-driven discoveries provide quantitative insights into the spatiotemporal patterns in the concentration and composition of PAHs, contributing to the mitigation of PAH contamination.

# WILDFIRES INFLUENCE MERCURY TRANSPORT, METHYLATION, AND BIOACCUMULATION IN HEADWATER STREAMS OF THE PACIFIC NORTHWEST Baldwin, A.K., J.J. Willacker, B.L. Johnson, Sa.E. Janssen, and C.A. Eagles-Smith. Environmental Science & Technology 58(32):14396-14409(2024)

Soil, water, sediment, in-stream leaf litter, periphyton, and aquatic invertebrates were sampled in 36 burned (one-year post-fire) and 21 reference headwater streams across the northwestern U.S. to evaluate the effects of wildfire occurrence and severity on total Hg (THq) and methylmercury (MeHg) transport and bioaccumulation. Suspended particulate total mercury (THg) and methylmercury (MeHg) concentrations were 89% and 178% higher, respectively, in burned watersheds compared to unburned ones. These levels also rose with burn severity, likely due to increased soil erosion. Filter-passing THg concentrations were similar in burned and unburned watersheds. Filter-passing MeHg was 51% greater in burned watersheds. Suspended particles in burned watersheds were enriched in MeHg but not THg, suggesting higher MeHg production in burned watersheds. Among invertebrates, MeHg in grazers, filter-feeders, and collectors was 33, 48, and 251% greater in burnet streshed; but did not differ in shredders or predators. Thus, increasing wildfire frequency and severity may yield increased MeHg production, and bioaccumulation in headwaters and increased transport of particulate THg and MeHg to downstream environments.

#### **General News**

GUIDELINES FOR SELECTING THE APPROPRIATE BIOACCUMULATION MODEL(S) FOR NONIONIC ORGANIC CONTAMINANTS WHEN ASSESSING RISK AND REMEDIAL EFFECTIVENESS AT CONTAMINATED SEDIMENT SITES

EPA Ecological Risk Assessment Support Center (ERASC), EPA/600/R-24/086, 58 pp, 2024

EPA's ERASC prepared guidelines providing an overview of bioaccumulation models for nonionic hydrophobic organic contaminants and an approach for selecting the appropriate bioaccumulation model(s). The document assists site managers and environmental scientists in selecting the optimum model(s) for bioaccumulation-related applications to assess risk or remedial effectiveness at contaminated sediment sites. Selecting which bioaccumulation model to use at a specific site involves balancing several critical parameters including:

- The objectives of the study, as well as which contaminants are being investigated and the purpose of the decision being made based on the modeled estimate, which will influence the level of accuracy and precision needed for the estimate(s) generated by the model.
  - 2. The type of data available or site-specific data that can be collected, and
  - 3. The resources available for applying a given model (i.e., level of effort, funding) to make an estimate.
- https://cfpub.epa.gov/si/si\_public\_file\_download.cfm?p\_download\_id=549631&Lab=CEMM

#### TOOLS FOR ENHANCING REAGENT DELIVERY TO ADDRESS MATRIX DIFFUSION IN LOW PERMEABILITY GEOLOGIC MATRICES Durant, N. Naval Facilities Engineering Command (NAVFAC) Open Environmental Restoration Resources Webinar Series, 54 minutes, 2024

This presentation overviews four technologies to enhance reagent delivery in situ: electrokinetics (EK); hydraulic fracturing; soil mixing; and permeable reactive columns emplaced via Bomber Technology. Case studies are presented that illustrate the design and implementation of these technologies at U.S. Department of Defense sites. https://www.youtube.com/watch2v=2ql dChT3iQL

#### OVERVIEW OF STATE APPROACHES TO VAPOR INTRUSION: 2023 UPDATE

Eklund, B., C. Regan, R. Rago, and L. Beckley. Groundwater Monitoring & Remediation 44(3):76-93(2024)

This paper summarizes current vapor intrusion (VI) guidance, petroleum hydrocarbon-specific VI guidance, and/or media-specific volatilization criteria in broader regulatory programs. Since 2018, 30 states have revised their guidance, issued new guidance or updated criteria or other VI-related information. For each state and the District of Columbia, the review includes tabulations of the available types of screening values (e.g., soil, groundwater, soil gas, and indoor air), the screening values for selected tochemicals that commonly drive VI investigations (e.g., TCE, PCE, benzene, and other selected VOCS), and the basis of risk levels used for cancer and non-cancer risk. Federal values are also included for comparison. It also summarizes available key policy criteria for each state, including trigger distances, default subsurface to indoor air attenuation factors, policies for evaluation of petroleum VI, strategies for preferential pathways, and policies for mitigation of VI. <u>https://ngwa.onlinelibrary.wiley.com/doi/endf/10.1111/gwmr.12627</u>

#### BIOREMEDIATION OF SOILS CONTAMINATED WITH PFAS: AN UPDATE ON AVAILABLE TECHNIQUES, PILOT STUDIES, CHALLENGES, AND FUTURE DIRECTIONS Beskoski, V., M. Ljesevic, B. Jimenez, J. Munoz-Arnanz, P. Colomer-Vidal, H. Inui, and T. Nakano. Soil Remediation Science and Technology Chapter, pages 331-366, 2024

This chapter aims to address the problem of PFAS pollution, with a specific focus on their occurrence in soil and the current state of the most effective remediation approaches employed.

#### LESSONS LEARNED APPLYING COMPOUND SPECIFIC ISOTOPE ANALYSIS IN LARGE, DILUTE, AND CO-MINGLED GROUNDWATER PLUMES Leslie, K. Battelle 2024 Chlorinated Conference, 2-6 June, Denver, CO, 23 slides, 2024

Compound specific isotope analysis (CSIA), including 2D) analysis, was applied at several complex sites with large, dilute groundwater plumes where contaminants were co-mingled and/or the source area(s) were unknown. Lessons learned were compiled regarding the specific challenges in applying CSIA to identify source area(s), evaluate contaminant plume co-mingling, determine groundwater flow direction, and asses natural attenuation. Based on the lessons learned, a stepwise framework was developed:

- Qualitative evaluation using 2D isotopic values and groundwater flow pathways to identify areas most closely resembling the TCE source (i.e., lightest isotopic composition).
- Semi-quantitative evaluation to evaluate the data to fit the Rayleigh model and determine if physical or chemical attenuation is occurring.
  Quantitative evaluation to calculate enrichment factor, determine the degradation process(es) occurring, and calculate the degradation rate along a groundwater flow path

The quantitative evaluation could not be completed at some complex sites with large, dilute, co-migled plumes. However, using qualitative and semi-quantitative steps of the framework can still provide valuable site characterization, including source identification, confirmation of groundwater flow pathways, evaluation of co-mingled contaminants, and confirmation that natural attenuation is occurring. These results can significantly change the conceptual site model and optimize the remedial approach. https://cracademy.s3.amazonaws.com/battelle/2024\_Chionated/C2\_1440\_424\_Lestie onff

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 <u>adam.michael@epa.gov</u> or (703) 603-9915 with any comments, suggestions, or corrections.

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