

Technology Innovation News Survey

Entries for September 16-30, 2020

Market/Commercialization Information

EXPRESSION OF INTEREST (EOI) FOR BLANKET MASTER AGREEMENT (BMA): "HUMAN HEALTH & ENVIRONMENTAL RISK ASSESSMENT & MODELING"

Washington River Protection Solutions LLC, DOE, Contractor Richland, WA.
Contract Opportunities at Beta.SAM, Solicitation 2DB00-SDM-KDS-061620-R2, 2020

As a prime contractor to DOE, Washington River Protection Solutions LLC (WRPS) is requesting expressions of interest as a means of conducting market research to identify parties having an interest in and the resources to demonstrate capability to perform human health and environmental risk assessment and performance assessment modeling and documentation of work associated with the waste removal, tank closure, waste processing, and disposal for the Hanford Tank Farms' 149 single-shell tanks (SST) and associated ancillary equipment. Waste is currently being removed from individual SSTs. Human health and environmental risk assessments/performance assessments are required to support evaluation of the long-term impact of closed facilities, including tank farms and waste disposal facilities. Work will be performed under a blanket master agreement, with separate subcontract releases issued for specific work. WRPS anticipates work duration to begin October 1, 2021, and run through FY 2022, with four option years. Interested firms are invited to submit an expression of interest and capability by 4:00 PM PT on November 12, 2020. The RFP process likely will begin in April 2021. The assigned NAICS code is 541620.
<https://beta.sam.gov/opp/5df8c0ef4474470ebdf94bcb034fb8f8/view>

EMERGING ENVIRONMENTAL REQUIREMENTS ACQUISITION (EERA)

Dept of the Army, W2V6 Engineering Support Center, Huntsville, AL.
Contract Opportunities at Beta.SAM, Solicitation W912DY19R0037(b), 2020

The objective of this multiple-award task-order contract (MATOC) is to procure contractor services to perform Military Munitions Response Program responses involving conventional munitions and chemical warfare materiel (CWM); environmental compliance and remediation services; and other munitions-related services under NAICS code 562910. The services provided under this contract will be used in support of various DoD commands and installations and other federal agencies at sites located throughout the United States. Contractor services will include safely locating, identifying, recovering, evaluating, assessing, packaging, transporting, managing, and making final disposition as required of munitions and explosives of concern, CWM, and hazardous, toxic and radioactive waste. Period of performance is 24 months from time of award. Offers are due by 2:00 PM CT on November 12, 2020.
<https://beta.sam.gov/opp/1c5c2467be9d4dd4b4e114f2be7a9f99/view>

IDIQ MATOC FOR ENVIRONMENTAL REMEDIATION SERVICES IN SUPPORT OF THE FORMERLY USED DEFENSE SITE PROGRAM FOR THE ALBUQUERQUE DISTRICT

U.S. Army Corps of Engineers, Albuquerque District, NM.
Opportunities at Beta.SAM, Solicitation W912PP21R0008, 2020

The USACE Albuquerque District has issued this sources sought notice as market research to gain knowledge of the interest, capabilities and qualifications of small business, section 8(a), HUBZone, and service-disabled veteran-owned small business (SDVOSB) under NAICS code 562910. This forthcoming requirement for an IDIQ multiple-award task-order contract (MATOC) for environmental remediation services within the Albuquerque District's area of responsibility includes the entire state of New Mexico, southern Colorado, and west Texas. Total shared capacity among all MATOC holders for the base contract shall not exceed \$50M over the 5-year period of performance. Fixed-price task orders are anticipated for a wide range of environmental services at Military Munitions Response Program and hazardous, toxic, and radioactive waste sites. Responses are due by 2:00 PM MT on November 16, 2020. Release of the solicitation is anticipated on or about March 18, 2021. <https://beta.sam.gov/opp/2f7e6849810646f1a80b6aa750059b7e/view>

A/E SERVICES FOR ENVIRONMENTAL ENGINEERING SERVICES

U.S. Army Corps of Engineers, Louisville District, Louisville, KY.
Contract Opportunities at Beta.SAM, Solicitations

The USACE Louisville District has issued two separate requests for submittal of SF-330s by firms capable of performing work under NAICS code 541330 on a wide variety of hazardous, toxic, and radiological sites in addition to other environmental sites. One multiple-award task-order contract (MATOC) is a total small business set-aside and other is an 8(a) set-aside. Each of the two A-E MATOCs aims to award up to five firm-fixed-price IDIQ contracts to provide environmental engineering services at any location within the USACE's assigned mission areas. Once a MATOC is established, projects will be awarded by individual task orders competed among the awarded IDIQ contracts. The ordering period for each MATOC will be five years, no options, with a shared not-to-exceed capacity of \$40M. The A-E services required will support military and civil environmental programs for several federal agencies, including the Army, Army Reserves, National Guard, Air Force, Navy, Marine Corps, Defense Logistics Agency, other DoD services, USEPA, and other federal agencies. Estimated award date is March 2021. SF-330 responses for either MATOC must be received by 10:00 AM ET on November 20, 2020. **Solicitation W912QR21R0011 - total small business set-aside:** <https://beta.sam.gov/opp/94bea298ac0b4afab3c13a663c18c17f/view>
Solicitation W912QR21R0012 - 8(a) small business set-aside: <https://beta.sam.gov/opp/e5ab0a70a8bf496da08a7f95ebf35d52/view>

SAVANNAH RIVER SITE INTEGRATED MISSION COMPLETION CONTRACT

DOE, Environmental Management Consolidated Business Center (DOE/EM), Cincinnati, OH.
Contract Opportunities at Beta.SAM, Solicitation 89303319REM000055, 2020

This acquisition is unrestricted and contains no small business set-aside provisions. The NAICS code is 562910. The final RFP for the Savannah River Site Integrated Mission Completion Contract procurement for remediation services has been posted to beta.sam and to the DOE/EM dedicated website at <https://www.emcbc.doe.gov/SEB/srsimc/rfppage.php>. The Government contemplates award of an IDIQ contract under which firm-fixed-price and/or cost-reimbursement task orders may be issued resulting from this solicitation. Offers are due by 3:00 PM ET on December 1, 2020.
<https://beta.sam.gov/opp/2c55de10a5914cf49a4e75f259655682/view>

Cleanup News

FLOATING TREATMENT WETLANDS AS A SUITABLE OPTION FOR LARGE-SCALE WASTEWATER TREATMENT

Afzal, M., M. Arslan, J.A. Muler, G. Shabir, E. Islam, R. Tahseen, M. Anwar-ul-Haq, et al.
Nature Sustainability 2:863-871(2019)

The performance of full-scale floating treatment wetlands (FTWs) installed in stabilization ponds in remediating sewage and industrial wastewater from Faisalabad, Pakistan were evaluated over three years. FTWs promoted substantial improvement of all water quality indicators and reduced heavy metal concentrations in the effluent compared to the influent. The systems' maximum removal capacities were 79% of chemical oxygen demand, 88% of biochemical oxygen demand, and 65% of total dissolved solids. Performance was optimal in the second and third years of operation, during which about 60 million m³/year of wastewater was treated at the cost of US \$0.00026/m³.

MATERIAL FLOW ANALYSIS AND HEAVY HYDROCARBON REMOVAL IN A FULL-SCALE BIOPILE AND SOIL WASHING PLANT IN NORTHERN ITALY

Vaccari, M., F.D. Castro, and M. Stolfini.
Waste Management & Research: The Journal for a Sustainable Circular Economy [Published online 22 June 2020 prior to print]

Mass fluxes and removal efficiencies of heavy hydrocarbons were assessed in a full-scale plant in northern Italy. This plant receives and treats contaminated soil and rocks from construction and demolition activities, incineration slags, and street-cleaning residues. The three sections of the plant -- bioremediation using biopiles, soil washing, and stabilization/solidification -- can perform independently or with others. Hydrocarbon mass fluxes showed that a considerable amount of pollutants was removed. From 2009-2014, removal efficiencies of the bioremediation, the soil washing section and the entire plant were respectively 73%, 58%, and 62%. The percentages of removal attained at the facility were sufficient to ensure the possibility of recovering the waste or disposing of it in different landfill categories.

PERFORMANCE OF A FULL SCALE CONSTRUCTED WETLAND AS ECOLOGICAL PRACTICE FOR AGRICULTURAL DRAINAGE WATER TREATMENT IN NORTHERN ITALY

Lavrnica, S., X. Nan, S. Blasioli, I. Braschi, S. Anconelli, and A. Toscano.
Ecological Engineering 154:105927(2020)

A full-scale surface flow constructed wetland (SFCW) was built in 2000 in Northern Italy to remediate agricultural drainage water. In-deep monitoring conducted

from 2018-2019 showed that the system achieved good retention of $\leq 82\%$ for total suspended solids and $\leq 78\%$ for total nitrogen (TN) and NO_3^- -N. Total phosphorus (TP) retention was $\sim 27\%$, but further analysis showed that the SFCW performed well in this aspect, and precipitation loads are important in the overall balance. Soil content of nutrients and different trace elements did not show considerable differences when compared to the beginning of the monitoring period. The uptake rates of TN and TP by above-ground vegetation were 19.0-26.3 and 1.6-2.1 g/m², respectively.

TRACKING MULTIPLE AROMATIC COMPOUNDS IN A FULL-SCALE COKING WASTEWATER RECLAMATION PLANT: INTERACTION WITH BIOLOGICAL AND ADVANCED TREATMENTS

Rena, J., J. Li, J. Li, Z. Chen, and F. Cheng. | Chemosphere 222:431-439(2020)

The occurrence, fate, and removal of aromatic compounds were investigated in an eight-stage full-scale coking wastewater (CWW) reclamation plant. PAHs, phenols, and heterocyclic compounds accounted for 38.9%, 33.5%, and 22.6% of the total organics in the CWW, respectively. PAHs were more sensitive to anaerobic digestion, while phenols and heterocyclics had higher bioavailability in the aerobic process. The interaction between biorefractory organics and advanced treatments suggested that multiple aromatic compounds were selectively removed along the treatment train. Coagulation, sand filtration, ultrafiltration, adsorption, nanofiltration, and reverse osmosis eliminated residual isoquinoline, phenol, cresol fluoranthene, benzene, and humic-like organics. Adsorption was a key step for removing chromophoric PAHs with more aromatic rings while fouling control in the endpoint membrane systems should be focused on the elimination of BTEXs and humic-like substances.

PERFORMANCE AND REFRESH OF A FULL SCALE BIOWALL SYSTEM: A LINES OF EVIDENCE APPROACH TO IDENTIFYING SYSTEM DEPLETION AND LESSONS LEARNED

Griffiths, D. | RemTEC Summit, February 26-28, 2019, Denver, Colorado, poster, 2019.

The Seneca Ash Landfill remedy included excavating the source and installing a zero-valent iron permeable reactive barrier (ZVI PRB) at the toe of a TCE plume. After the ZVI PRB was installed, an assessment predicted the plume lifespan would outlast the life of the ZVI PRB. As a result, 2,840 ft of bark mulch PRBs were installed in 2006 to enhance groundwater restoration. After 10 years of successful performance, the biowalls were reaching depletion, and a declining remedy performance led to a biowalls refresh in 2017 to extend remedy performance. Biowall depletion was identified through a lines-of-evidence approach consisting of statistical analysis of geochemical and volatile organic carbon trends.

<https://www.remtecsummit.com/ext/resources/Static-Pages/presentations/Dan-Griffiths.pdf>.

Demonstrations / Feasibility Studies

PERFORMANCE EVALUATION OF MICROBE AND PLANT-MEDIATED PROCESSES IN PHYTOREMEDIATION OF TOLUENE IN FRACTURED BEDROCK USING HYBRID POPLARS

Ben-Israel, M., Ph.D. thesis, The University of Guelph, 163 pp, 2020

A multi-year field study was conducted on a pilot phytoremediation system at an urban site to address aged toluene impacts to a shallow fractured dolostone aquifer. Most phyto-available toluene was degraded/attenuated before uptake. Phytoextraction rates were quantified in a subset of trees over a two-week peak-season period. Phytoextraction was greatest in the site's high-impact region where trees had distinct, more uniform root-colonizing bacterial communities. Stem phyllosphere microbiomes showed enrichment in predictive degradation capacity with increasing toluene exposure. Microbial diversity and richness in the phyllosphere were seasonally dynamic, increasing in the late growing season. A lab-scale DNA stable isotope probing study identified novel toluene-degrading bacteria and fungi taxa in the soil. Their taxonomic gene sequences were made available for future studies.

https://atrium.lib.uoguelph.ca/xmlui/bitstream/handle/10214/17822/BenIsrael_Michael_202003_PhD.pdf?sequence=3&isAllowed=y

FINAL YEAR 1 SEMI-ANNUAL REPORT FOR THE SITE INVESTIGATION FOR MONITORED NATURAL ATTENUATION PILOT STUDY SITE 38 TORPEDO REWORK FACILITY VOLUME 1 OF 3 NAS JACKSONVILLE FL

Tetra Tech on behalf of Naval Facilities Engineering Command Southeast, 1,927 pp, 2020

The 2016 Focused Feasibility Study for Potential Source of Contamination (PSC) 38 selected monitored natural attenuation (MNA) to prevent unacceptable human exposure to contaminated groundwater. Before implementing the remedy, a pilot test was implemented to determine if MNA was effective and viable. In March 2019 and June (Quarter 2) 2019, six monitoring wells were sampled for select metals, pesticides, PAHs, VOCs, and MNA parameters. An evaluation of groundwater analytical results and field parameters revealed that reducing conditions are present in some portions of the aquifer, which may support reductive pathways.

https://www.navfac.navy.mil/niris/SOUTHEAST/JACKSONVILLE_NAS/N00207_004794.PDF
Volume 2: Target Compound Quantitation Reports https://www.navfac.navy.mil/niris/SOUTHEAST/JACKSONVILLE_NAS/N00207_004795.pdf
Volume 3: Sampling Reports https://www.navfac.navy.mil/niris/SOUTHEAST/JACKSONVILLE_NAS/N00207_004796.pdf

STARX HOTPAD FOR SMOLDERING TREATMENT OF WASTE OIL SLUDGE: PROOF OF CONCEPT AND SENSITIVITY TO KEY DESIGN PARAMETERS

Solinger, R., G.P. Grant, G.C. Scholes, C. Murray, and J.I. Gerhard. Waste Management & Research: The Journal for a Sustainable Circular Economy 38(5): 554-566(2020)

Pilot-scale experiments for the Self-sustaining Treatment for Active Remediation applied ex situ (STARx) Hotpad were conducted, using the technology as a mobile treatment of waste oil sludge (WOS) mixed with sand or contaminated soil. Results revealed that the hotpad design was successful for WOS treatment across various scenarios and demonstrated the potential for smoldering channeling to develop. Field-scale simulations predicted successful treatment, with WOS destruction rates an order of magnitude higher than the pilot-scale and treatment times increasing only linearly with bed height.

HIGH-RESOLUTION CHARACTERIZATION OF A CHLORINATED SOLVENT IMPACTED AQUIFER USING A PASSIVE PROFILER

H.A. Schneider, W.A. Jackson, P.B. Hatzinger, and C.E. Schaefer. Groundwater Monitoring and Remediation [Published online 13 September 2020 prior to print]

A direct-drive high-resolution passive profiler (HRPP) was field-tested to quantify and delineate concentrations of CVOCs, geochemical indicators, and CVOC-degrading microorganisms/genes as well as perform compound-specific stable isotope analysis (CSIA) and estimate interstitial velocity at

AQUIFER IMAGING WITH OSCILLATORY HYDRAULIC TOMOGRAPHY: APPLICATION AT THE FIELD SCALE

Cardiff, M., Y. Zhou, W. Barrash, and P.K. Kitanidis. Groundwater 58(5):710-722(2020)

A field application of oscillatory hydraulic tomography was carried out at the Boise Hydrogeophysical Research Site (BHRS) to characterize the heterogeneity of aquifer hydraulic properties. An oscillating signal generator was used with a very small cycling volume of

Research

INVESTIGATING SORPTION BEHAVIOUR OF PERFLUOROALKYL SUBSTANCES TO BIOCHAR

Askeland, M.P.J., Bachelor's Thesis, RMIT University, 161 pp, 2019

Biochar characteristics were manipulated by varying feedstock type and pyrolysis conditions to determine how they impacted biochar PFAS sorption capacity. Results indicated a wide variety of physicochemical parameters could be manipulated. The study was expanded to better understand what characteristics were more beneficial for PFAS sorption at environmentally relevant concentrations when pyrolyzed at 300, 500, and 700°C. Low-temperature biochar sorbed

https://researchrepository.rmit.edu.au/discovery/delivery?vid=61RMIT_INST:ResearchRepository&repId=12248273250001341#13248405470001341

A TAILORED PERMEABLE REACTIVE BIO-BARRIER FOR IN SITU GROUNDWATER REMEDIATION: REMOVAL OF 3-CHLOROPHENOL AS A CASE STUDY

Miller, E., O. Menashe, and C.G. Dosoretz. Environmental Technology [Published online 10 September 2020 prior to print]

Reduced carbon-contaminants (RCC) were subjected to bacterial aerobic biodegradation using *Pseudomonas putida* in a pilot system that mimicked saturated aquifer remediation in a permeable reactive biobarrier (PRBB). 3-Chlorophenol (3CP) at a concentration range of 350-500 mg/L was chosen as an RCC model compound. Findings indicated efficient 3CP biodegradation during the PRBB operation with a similar degree of transformation (76±2% and 72±2%) and mineralization (55±4% vs. 49±3%) for exogenous and built-in nutrients supply, respectively. The extent of dechlorination in both cases (54±10% vs. 40±2%, respectively) suggested that Cl release took place in late transformation stages. Negligible decontamination was observed in the control system without bioaugmentation.

METAL-ORGANIC FRAMEWORK-PLANT NANOBIOSYSTEMS AS LIVING SENSORS FOR ON-SITE ENVIRONMENTAL POLLUTANT DETECTION

Liang, J., M.Y.B. Zulkifli, S. Choy, Y. Li, M. Gao, B. Kong, J. Yun, and K. Liang.
Environmental Science & Technology 4(18):11356-11364(2020)

Roots of *Syngonium podophyllum* were immersed in an aqueous solution of disodium terephthalate and terbium chloride hexahydrate sequentially for 12 h to create photoluminescent metal-organic framework (MOFs)-plant nanobiohybrids to detect various toxic metal ions and organic pollutants. The plants served as self-powered pre-concentrators via their passive fluid transport systems and accumulated pollutants around the embedded MOFs, resulting in relative fluorescence intensity changes. The nanobiohybrids initiated superior selectivity and sensitivity (0.05-0.5 μM) in water for Ag^+ , Cd^{2+} , and aniline with a "turn-up" fluorescence response, and for Fe^{3+} and Cu^{2+} with "turn-down" fluorescence response (0.05-10 μM , precision and accuracy of 5 and 10%, respectively). With the easy-to-read visual signals under ultraviolet light, the app translates plant luminescent signals into digital information on a smartphone to monitor environmental pollutants with high sensitivity and specificity on-site.

ON THE PERFORMANCE OF PILOT-POINT BASED HYDRAULIC TOMOGRAPHY WITH A GEOPHYSICAL A PRIORI MODEL

Poduri, L.S. and B.V.N.P. Kambhammettu.
Groundwater [Published online 29 September 2020 prior to print]

The performance of a pilot-point-based hydraulic tomography (HT) inversion method was evaluated on a hypothetical, two-dimensional, multi-layered, granitic aquifer system representative of those commonly occurring in the Kandi region in Telangana. The method was used in conjunction with a geophysical a priori model. Results showed that using the a priori model could improve the parameter-estimation process.

CHEMICAL DECOMPOSITION COMBINED WITH PHYSICAL ADSORPTION FOR THE TREATMENT OF INVESTIGATION-DERIVED WASTE CONTAINING PFAS

Choi, H. SERDP Project ER18-1482, 53 pp, 2020

Adsorption-mediated chemical oxidation was integrated with chemical reduction into one engineered system to synergistically remove and decompose PFAS. Transition metals in any form were conjugated with common oxidants to generate various oxidizing and reducing species through Fenton-like reactions. PFAS chemical decomposition was also combined with their physical adsorption by utilizing transition metal particles impregnated into granular activated carbon's mesoporous structure. Results showed the modified Fenton system is effective to remove PFAS. Chemical oxidants conjugated with transition metals decomposed PFAS, particularly carboxylic PFAS, under ambient conditions. Sulfonic PFAS were removed mainly via adsorption mechanism while remaining undecomposed. <https://www.serdp-estcp.org/content/download/51830/510053/file/ER18-1482%20Final%20Report.pdf>

THEORETICAL EVALUATION OF CHEMICAL AND PHYSICAL FEASIBILITY OF AN IN SITU ULTRASONIC REACTOR FOR REMEDIATION OF GROUNDWATER CONTAMINATED WITH PER- AND POLYFLUOROALKYL SUBSTANCES

Laramay, F., and M. Crimi. | Remediation [Published online 30 September 2020 prior to print]

Four PFAS-contaminated site groundwaters were treated in a laboratory sonolytic reactor. The data was used in a series of hypothetical case studies to evaluate the influence of chemical and physical properties on the feasibility of installing an in situ sonolytic reactor in a horizontal well. When included in the remediation goals, PFAS precursor species and PFBA drove the hydraulic retention times necessary for effective treatment compared to longer-chain PFAS. Improved implementation efficiency occurred when the target treatment area was restricted to a concentrated source zone, rather than less concentrated areas of the downgradient plume.

HYDROTHERMAL TECHNOLOGIES FOR ON-SITE DESTRUCTION OF SITE INVESTIGATION WASTES CONTAMINATED WITH PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Strathmann, T.J., C. Higgins, and R. Deeb, SERDP Project ER18-1501, 89 pp, 2020

This limited scope project evaluated the effectiveness of applying nascent hydrothermal conversion technologies to destroy PFASs and co-contaminants in liquid and soil wastes. The research identified reaction conditions and low-cost amendments that promote rapid degradation and defluorination of PFAS associated with aqueous film-forming foam (AFFF), assessed the reaction kinetics and mechanisms, and applied the process to treat PFAS-contaminated water and soil samples. Results demonstrate that hydrothermal treatment can be an effective alternative to off-site incineration. <https://www.serdp-estcp.org/content/download/51763/509010/file/ER18-1501%20Final%20Report.pdf>

COMPLETE REDUCTIVE DEFLUORINATION OF PFAS BY HYDRATED ELECTRONS GENERATED FROM 3-INDOLE-ACETIC-ACID IN CHITOSAN-MODIFIED MONTMORILLONITE

Dong, H. SERDP Project ER18-1526, 29 pp, 2020

A study was conducted to develop a technique to effectively degrade PFASs under specific conditions in a wastewater facility using hydrated electrons generated from 3-indole-acetic acid (IAA) within the interlayer region of chitosan- and 12-amino lauric acid (ALA)-intercalated montmorillonite. Hydrated electrons were photogenerated via IAA and induced co-sorbed PFC defluorination by utilizing the hydrated electrons' reductive power. The near-complete degradation of PFOS occurred within the first few hours of irradiation. The use of the ALA and chitosan-modified montmorillonites promoted the degradation process by stabilizing the reaction during photolysis, which prolonged the half-life of the hydrated electrons. <https://www.serdp-estcp.org/content/download/51831/510063/file/ER18-1526%20Final%20Report.pdf>

NATURAL ATTENUATION METHOD FOR CONTAMINANT REMEDIATION REAGENT DELIVERY ASSESSMENT FOR IN SITU CHEMICAL OXIDATION USING AQUEOUS OZONE

Khan, N.A. and K.C. Carroll. | Chemosphere 247:125848(2020)

A monitored natural attenuation (MNA) assessment approach was developed to assess remediation-reagent delivery. Mixed reactor kinetic experiments, sand column tracer transport experiments, and reactive transport modeling and assessment methods were compared to quantify natural attenuation kinetics, aqueous ozone (O_3) solute transport, oxidant demand kinetics, and in situ chemical oxidation reagent delivery limitations. Results suggested that aqueous O_3 decomposition and oxidant delivery attenuation can be predictable upon characterization of the sediment oxidant demand and dispersion. Increasing groundwater velocity during aqueous O_3 injection can maximize transport distance for reagent delivery.

General News

LNAPL RECOVERY ENDPOINTS: LESSONS LEARNT THROUGH MODELING, EXPERIMENTS, AND FIELD TRIALS

Lari, K.S., J.L. Rayner, G.B. Davis, and C.D. Johnston.
Groundwater Monitoring & Remediation [Published online 17 June 2020 prior to print]

This article summarizes recent advances to improve estimates of a recoverable LNAPL fraction and its transmissivity, including further development and application of a well-validated model to characterize active LNAPL recovery endpoints. The article also presents key factors that affect LNAPL recovery endpoint determination and outlines how recovery endpoints are affected by natural source zone depletion. Major factors include geophysical characteristics of the formation, magnitude of an LNAPL release, and partitioning properties of the key LNAPL constituents of concern. Based on the validated model's capabilities, the publication also provides a basis to optimize LNAPL recovery efforts. <https://ngwa.onlinelibrary.wiley.com/doi/pdf/10.1111/gwmmr.12400>

PFAS DEGRADATION AND MASS REMOVAL USING THERMALLY ENHANCED PERSULFATE OXIDATION FOLLOWED BY PUMP-AND-TREAT

Kornuc, J., R.A. Deeb, and D. Sedlak, ESTCP Project ER-201729, 37 pp, 2020

Site-specific treatability studies were conducted to validate the performance of in situ thermally-enhanced persulfate oxidation at low pH to destroy PFAS. The technology would need to be combined with pump-and-treat to fully address a mixed PFAS source zone since it is not expected to fully destroy all PFAS. A planned field demonstration was not conducted due to funding restraints. The project team is considering other opportunities to leverage funding and conduct a technology demonstration soon. Meanwhile, this final project report documents treatability study findings, implications for field demonstration design, and future technology research and development recommendations. <https://www.serdp-estcp.org/content/download/51824/510001/file/ER-201729%20Final%20Report.pdf>

IONIC FLUOROGELS FOR REMEDIATION OF PER- AND POLYFLUORINATED ALKYL SUBSTANCES FROM WATER

Kumarasamy, E., I.M. Manning, L.B. Collins, O. Coronell, and F.A. Leibfarth.
ACS Central Science 6(4):487-492(2020)

An ionic fluorogel resin was developed to remove a chemically diverse mixture of PFAS from water effectively. The resin has demonstrated rapid removal of PFASs with high affinity and selectivity in the presence of nonfluorous contaminants commonly found in groundwater. The material can be regenerated and reused multiple times. The ionic fluorogels were demonstrated to be effective adsorbents in removing 21 legacy and emerging PFASs from settled water

collected at the Sweeney Water Treatment Plant in Wilmington, North Carolina.

TIERED APPROACH TO SUSTAINABILITY ANALYSIS IN SEDIMENT REMEDIATION DECISION MAKING

McNally, A.D., A.G. Fitzpatrick, D. Harrison Jr., A. Busey, and S.E. Apitz.
Remediation [Published online 13 September 2020 prior to print]

This article explores how environmental, social, and economic sustainability analyses can be tailored for different tiers of assessment for sediment remediation projects, ranging from simple (Tier 1) to complex (Tier 3). Tools at all assessment tiers add value for a project; they can effectively provide context and tradeoffs for stakeholders and decision-makers.

REVIEW OF LABORATORY SCALE MODELS OF KARST AQUIFERS: APPROACHES, SIMILITUDE, AND REQUIREMENTS

Mohammadi, Z., W.A. Illman, and M. Field.
Groundwater [Published online 26 September 2020 prior to print]

This review focuses on investigations of groundwater flow and solute transport in karst aquifers through laboratory-scale models (LSMs) and introduces a framework to construct a karst aquifer physical model representing field conditions. The review groups LSMs into sandbox, rock block, pipe/fracture network, and pipe-matrix coupling and highlights their advantages and disadvantages. Requirements are introduced for LSMs to be representative of karst aquifers: (1) the ability to simulate heterogeneous distributions of karst hydraulic parameters, (2) establish Darcian and non-Darcian flow regimes and exchange between the matrix and conduits, (3) placement of adequate sampling points and intervals, and (4) achieving some degree of geometric, kinematic, and dynamic similitude to represent field conditions.

HIGH-RESOLUTION SITE CHARACTERIZATION (HRSC): INNOVATIVE DIRECT-PUSH TECHNOLOGIES FOR THE RAPID DELINEATION OF SUBSURFACE PETROLEUM HYDROCARBON IMPACTS

Garcia, E. | 26th International Petroleum Environmental Conference, 7-9 October, San Antonio, Texas, 2019

This presentation provides an overview of several innovative direct-push technologies, including the Hydraulic Profiling Tool, Optical Image Profiler, and UVOST® / TARGost® optical screening tools, to provide qualitative or semi-quantitative results in real-time and identify the hydrostratigraphic/hydrogeologic environment where LNAPL resides. <https://cese.utulsa.edu/wp-content/uploads/2019/11/IPEC-2019-E.-Garcia-ConeTec.pdf>

IN SITU GROUNDWATER REMEDIATION WITH BIOELECTROCHEMICAL SYSTEMS: A CRITICAL REVIEW AND FUTURE PERSPECTIVES

Ceconet, D., F. Sabba, M. Devecseri, A. Callegari, and A.G. Capodaglio.
Environment International 137:105550(2020)

This review analyzes in situ bioelectrochemical system applications for groundwater remediation, focusing on different proposed setups, and identifies and discusses the existing research gaps in the field.

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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