Technology Innovation News Survey

Entries for June 1-15, 2019

Market/Commercialization Information

EMERGENCY AND RAPID RESPONSE SERVICE (ERRS) EPA REGION 4
U.S. Environmental Protection Agency, Region IV, Atlanta, GA.
Federal Business Opportunities, Solicitation 68HE0419R0011, 2019

U.S. EPA Region 4 is performing market research for informational purposes only to determine the availability of small, small disadvantaged, 8(a), woman-owned, HUBZone, and service-disabled veteran-owned small businesses capable of meeting the requirements for the follow-on ERRS contract for EPA Region 4 (i.e., Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee) under NAICS code 562910. The purpose of the ERRS contract is to conduct emergency responses and time-critical/non-time-critical removals and remedial actions with respect to the release or threat of release of oil, hazardous and toxic wastes, petroleum products, hazardous substances, pollutants, contaminants, or fire or explosion hazards that pose an actual or potential threat to human health or welfare or the environment. This effort will include cleanup for incidents involving weapons of mass destruction, acts of terrorism, and nuclear, biological, and chemical incidents. Interested parties are invited to submit capabilities statements as well as comments or questions on the draft documents attached to the FedBizOpps notice. Responses must be received by 12:00 noon ET on July 30, 2019.
https://www.fbo.gov/spg/EPA/OAM/RegIV/68HE0419R0011/listing.html

MARKET RESEARCH AND SOURCES SOUGHT TO GAIN KNOWLEDGE OF POTENTIAL QUALIFIED CONTRACTORS FOR A FUTURE IDIQ PROCUREMENT TO ACQUIRE ENVIRONMENTAL REMEDIATION SERVICES IN SUPPORT OF MOBILE DISTRICT'S INSTALLATION RESTORATION PROGRAM
Department of the Army, US Army Corps of Engineers, USACE District, Mobile, AL.
Federal Business Opportunities, Solicitation W9127819L0042, 2019

The purpose of this notice is market research to gain knowledge of potential qualified small business, HUBZone, 8(a), service-disabled veteran-owned, and woman-owned small business firms under NAICS code 562910, size standard 750 employees. The USACE Mobile District anticipates a future IDIQ procurement to acquire environmental remediation services under individual task orders to support the District's Installation Restoration Program, specifically complex HTRW projects. Military-related environmental services will be on military/federal installations throughout the world, including the continental United States, its territories, South and Central America, and other nations. Civil works-related environmental services are anticipated to take place in mainly the southeastern United States. Interested firms are invited to respond with a brief (8 pages max) capabilities statement. Responses are due via email only by 12:00 noon CT on July 31, 2019. https://www.fbo.gov/spg/USA/COE/DACA01/W9127819L0042/listing.html

SBIR E-LEARNING FOR HAZMAT AND EMERGENCY RESPONSE
National Institutes of Health, NIEHS, Funding Opportunity RFA-ES-19-009, 2019

The major objective of the NIEHS Worker Training Program (WTP) is to prevent work-related harm by assisting in the training of workers in how best to protect themselves and their communities from exposure to hazardous materials. NIEHS seeks Small Business Innovation Research (SBIR) grant applications from small business concerns that propose to further the development of (1) Advanced Technology Training (ATT) tools to assist in research into the acute and long-term health effects of environmental disasters and (2) products for the health and safety training of HAZMAT workers; waste treatment personnel; skilled support personnel associated with an emergency/disaster; emergency responders in biosafety response, infectious disease training, and cleanup; and emergency responders in disasters and resiliency training. ATT includes online training, virtual reality, and serious gaming that complement all aspects of training from development to evaluation. These products must complement the goals and objectives of the WTP [more information at http://www.niehs.nih.gov/careers/hazmat/about_wetp/]. The closing date for applications is July 31, 2019.
https://www.grants.gov/web/grants/view-opportunity.html?oppId=315372

FY 2019 HAZARDOUS WASTE MANAGEMENT GRANT PROGRAM FOR TRIBES
Environmental Protection Agency, Funding Opportunity EPA-OLEM-ORCR-19-02, 2019

U.S. EPA invites federally recognized tribes or intertribal consortia to apply for grants for the development and implementation of hazardous waste programs and for addressing hazardous waste management capacity-building in Indian country. EPA recognizes tribal governments as the primary parties for managing programs for reservations. The goal of this effort is to provide technical assistance to tribes for activities that involve hazardous waste management on tribal lands [more information at https://www.epa.gov/grants/fy-2019-hazardous-waste-management-grant-program-tribes]. About 3 awards of up to $98,000 are anticipated out of estimated total program funding of $294,000. The closing date for applications is August 1, 2019.
https://www.grants.gov/web/grants/view-opportunity.html?oppId=317239

FY19 BROWNFIELDS TRAINING, RESEARCH, AND TECHNICAL ASSISTANCE GRANT
Environmental Protection Agency, Funding Opportunity EPA-OLEM-OBLR-19-03, 2019

U.S. EPA solicits proposals from eligible entities to conduct research and provide technical assistance to new, existing, and/or prospective EPA Environmental Workforce Development and Job Training (EWDJT) grantees. In addition to providing ongoing technical assistance throughout the project period, the successful applicant will be responsible for developing an annual meeting to facilitate peer-to-peer networking and provide training to the EWDJT grantees [more information at https://www.epa.gov/grants/fy19-brownfields-training-research-and-technical-assistance-grant]. EPA anticipates a single award with an estimated ceiling of $200,000. The closing date for applications is September 20, 2019.
https://www.grants.gov/web/grants/view-opportunity.html?oppId=318185

Cleanup News

ON-SITE TREATMENT OF A DISSOLVED CHROMIUM PLUME: FROM BENCH TRIAL TO REMEDIATION TO RESULTS
Rakewich, B. | SustainTech, 22 March, Saskatoon, Saskatchewan, 32 slides, 2018

A dissolved Cr plume originating from a nearby chrome plating facility was identified at an industrial property in Edmonton, Alberta. Soil impacts were isolated to two small source areas, but groundwater contamination was more widespread (~2,000 m^2). Dissolved Cr(VI) concentrations were ≤300 mg/L and total Cr concentrations were ≤308 mg/L at the source areas, with target numerical guidelines of 0.001 mg/L and 0.0089 mg/L. Three 60-cm wells were installed with submersible pumps that used 1,550 kg ferrous sulfate ($FeSO_4$) to treat a total of 334,700 L of groundwater. About 20,900 L injection solution was used to remediate the low-concentration plume. In situ chemical reduction using 15% $FeSO_4$) was tested and used to remediate soil. Testing in 2017 confirmed contamination reduction by ~99% in the source area. Confirmatory soil and groundwater sampling was conducted in 2018 to confirm contamination levels were stable.
https://www.seima.sk.ca/resources/Documents/SustainTech%202018%20Presentations/SustainTech%20Barry%20Rakewich%20Presentation%202018.pdf

EXPLANATION OF SIGNIFICANT DIFFERENCES: ONONDAGA LAKE BOTTOM SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE, MODIFIED PROTECTIVE CAPS
U.S. EPA, 30 pp, 2018

This ESD documents the basis for modified cap design and construction in the vicinity of the Onondaga County Metropolitan Wastewater Treatment Plant deepwater outfall pipeline and in portions of Remediation Areas (RAs) B, C, and D. The 2005 ROD defined the caps as a mixing layer, a ≥12-in chemical isolation layer, and a ≥12-in habitat/erosion protection layer. Cap stability and settlement evaluations concluded that a ROD-complaint cap would affect the integrity of the outfall pipe. A thinner modified erosion-resistant cap (MERC) design was implemented. The MERC consisted of 6 in of gravely sand amended with granular activated carbon (GAC). Revisions to cap design were necessary for the 3 RAs due to soft sediment localized on relatively steep slopes causing disturbances in the already-placed cap. Caps were designed to resolve specific issues in each RA and generally consisted of a habitat/erosion protection layer on top of a sand and GAC layer thinner than the ROD-compliant cap. Post-construction physical and chemical monitoring will be conducted in the MERC and RA areas to ensure the remedy meets the related goals specified in the 2005 ROD. https://www.dec.ny.gov/docs/remediation_hudson_pdf/olmpcesd0318.pdf

TECHNICAL SOLUTION FOR REMOVAL OF PFAS IN WATER
Buhl, J. | RemTEC Summit, February 26-28, 2019, Denver, Colorado. 20 slides, 2019

Groundwater investigations in Nuremberg, Germany, detected PFAS in groundwater downgradient of an airport site. A fire-fighting training area located near the airport was identified as the PFAS source in both the soil and groundwater. The maximum level of PFAS in the groundwater measured about 777 µg/L. Several techniques potentially suitable for treating PFAS in water were tested in the lab, including the PerfluorAd technology, which removed >90% of PFAS. Results from field trials undertaken in November 2014 led to the installation of a full-scale system in September 2015. Data from September through December 2015 showed a reduction of PFAS compounds of 86.7-98.09%. Remaining PFAS compounds were then removed with an activated carbon polish.
https://www.remtecsummit.com/ext/resources/Static-Pages/presentations/Jurgen-Buhl.pdf

EXPLANATION OF SIGNIFICANT DIFFERENCES SITE 8 - FIRE DEPARTMENT TRAINING AREA #2 PEASE AIR FORCE BASE NPL SITE

U.S. Air Force, 11 pp, 2019

This ESD provides U.S. EPA and the New Hampshire Department of Environmental Services with a description of and the rationale for the U.S. Air Force's proposed addition of a groundwater extraction and treatment system (GWETS) to the existing corrective measures for Site 8, Fire Department Training Area #2. Site 8's previous use for fire training activities from 1961-1988 led to PFOS and PFOA contamination in groundwater in areas where aqueous film-forming foam was used. Groundwater assessments in 2014 identified PFOA and PFOS at levels above the EPA 2009 provisional health advisories both on base and in private drinking water supplies. In response, U.S. EPA issued a Safe Drinking Water Act Administrative Order for the Pease Air Force Base in July 2015 that led to the GWETS construction. The system consists of multi-bag filters and liquid-phase granular activated carbon and four ion exchange resin vessels to remove PFOS and PFOA from the extracted groundwater. A long-term operating and monitoring plan requires the collection of groundwater elevation, PFAS concentration, and treatment system operational data to assess the performance of the GWETS to meet hydraulic containment and treatment objectives.
https://semspub.epa.gov/work/01/100011058.pdf

ENHANCING MICROBIAL SULFATE REDUCTION OF HYDROCARBONS IN GROUNDWATER USING PERMEABLE FILLED BORINGS

Buscheck, T., D. Mackay, C. Paradis, R. Schmidt, and N. de Sieyes.
Groundwater Monitoring & Remediation [Published online 11 Jun 2019 prior to print]

This paper presents a case study of permeable filled borings (PFBs) used to enhance sulfate biodegradation and reduce benzene concentrations in groundwater at a closed service station. Twenty-four boreholes were drilled near 4 monitoring wells and backfilled with gravel and 15,000 lbs gypsum for slow release of sulfate as it dissolved. Concurrently and for comparison, gypsum slurry was injected under high pressure in nine locations to produce a short-lived plume of sulfate. Monitoring of benzene and sulfate concentrations over a 3-year period showed that benzene concentrations in 2 wells near PFBs dropped below the cleanup goal, while 2 other PFB monitoring wells remained >1 mg/L, likely due to high sulfur demand from residual petroleum hydrocarbons (PHCs). Hydrogen and sulfur isotopic enrichment confirmed biodegradation of benzene and stimulation of sulfate-reducing conditions. PHC and benzene concentrations are expected to decline over time, eventually meeting the cleanup goal. https://ngwa.onlinelibrary.wiley.com/doi/epdf/10.1111/gwmr.12346

Demonstrations / Feasibility Studies

TREATMENT OPTIONS FOR THE EMERGING CONTAMINANTS 1,2,3-TRICHLOROPROPANE AND 1,2-DIBROMOETHANE

Hatzinger, P., and P. K. van Groos.
SERDP/ESTCP Webinar Series, Webinar #90, May 2019

The webinar consisted of two presentations. The first summarized ESTCP-funded research to demonstrate a novel reactive gas process for remediating vadose zone source areas containing trichloropropane (TCP). Lab treatability studies suggest that the process can be a viable approach for increasing soil pH and enhancing the alkaline hydrolysis of TCP and other COCs in a cost-effective manner. In the second presentation, 1,2-dibromoethane (EDB) natural attenuation was evaluated at a complex field site. In higher-concentration anaerobic zones at the site, the presence of ethene suggested that anaerobic debromination of EDB occurred, while in more dilute areas, EDB enriched in ^{13}C indicated slower degradation consistent with abiotic hydrolysis. In lab studies, anaerobic biostimulation was demonstrated to enhance EDB degradation in the field together with the enrichment of ^{13}C in EDB.
https://www.serdp-estcp.org/Tools-and-Training/Webinar-Series/05-23-2019

REMOVAL OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFASS) FROM CONTAMINATED GROUNDWATER USING GRANULAR ACTIVATED CARBON: A PILOT-SCALE STUDY WITH BREAKTHROUGH MODELING

Liu, C.J., D. Werner, and C. Bellona.
Environmental Science: Water Research & Technology [Published online prior to print]

Results from a 7-month pilot-scale granular activated carbon (GAC) system are presented in this study. The system treated a continuous source of PFAS-contaminated groundwater with four activated carbons: Calgon F400 and F600, and Norit GAC400 and GCN1240. Chain length-dependent breakthrough was generally observed for PFCAs and PFSAs, where shorter chain PFASs broke through faster than longer chain PFASs. All tested GACs performed similarly for weakly adsorbing shorter chain PFASs. F400 and GAC400 performed 40-50% better than F600 and GCN1240 for strongly adsorbing long chain PFASs.

A HIGH RESOLUTION PASSIVE FLUX METER APPROACH BASED ON COLORIMETRIC RESPONSES

Annable, M. | SERDP Project ER-2420, 76 pp, 2019

This project developed and tested a method for in situ measurements of high-resolution contaminant and water flux profiles using a colorimetric-based passive flux meter (cPFM). Lab studies were conducted to screen candidate sorbents and dyes to modify the current PFM design and validate the changes under controlled conditions. Field testing of the cPFM was conducted at the Charleston Air Force Base, South Carolina, and a University of Florida campus well located at Black Hall. Tests ranging from 12 to 23 days were conducted for varying durations to assess the accuracy of the cPFM. The project demonstrated how cPFMs could be used to collect high-resolution data while reducing costs. A breakdown of the material, labor, analysis, and shipping costs based on a single 2-ft design gave the overall cost for the standard PFM as $176 while that of the cPFM was $113, resulting in a 36% cost reduction. Future testing is required to improve accuracy in the field and refine the method. https://serdp-estcp.org/content/download/49443/471405/file/ER-2420%20Final%20Report.pdf

HYDROGEOCHEMICAL MODEL SUPPORTING THE REMEDIATION STRATEGY OF A HIGHLY CONTAMINATED INDUSTRIAL SITE

Ciampi, P., C. Esposity, and M.P. Papini.
Water 11:1371(2019)

A hydrogeochemical geodatabase that integrates the management, representation, and analysis of heterogeneous data was pilot tested to select, design and optimize the remediation of residual DNAPL (1,2-DCE and VC) at a former industrial site in the Po alluvial plain in Italy. Geodatabase results showed contamination in very low-permeable layers within the saturated zone that acted as a slow-release source of contamination. A new remedial technology was designed and pilot tested that couples groundwater circulation wells with a reactor containing PHB for the continuous production of electron donor to stimulate in situ bioremediation. The system continuously removes chlorinated solvent constituents that are mobilized by the recirculation of water through the zones with low permeability. The geodatabase was effective at managing and releasing data during the different remediation phases but required a large amount of multi-sourced data to build a reliable and high-resolution conceptual model and design the remediation strategy. Results will be used to design a full-scale system. https://www.mdpi.com/2073-4441/11/7/1371/pdf

CONCURRENT TREATMENT OF 1,4-DIOXANE AND CHLORINATED ALIPHATICS IN A GROUNDWATER RECIRCULATION SYSTEM VIA AEROBIC COMETABOLISM

Chu, M.-Y. J., P.J. Bennett, M.E. Dolan, M.R. Hyman, A.D. Peacock, A. Bodour, et al.
Groundwater Monitoring & Remediation 38(3):53-64(2018)

In situ aerobic cometabolic biodegradation (ACB) was field-tested for 265 days on groundwater contaminated with 1,4-dioxane (1,4-D), TCE, and 1,2-DCA at Operable Unit D of the former McClellan AFB. The in situ ACB reactor amended recirculated groundwater with propane and oxygen to stimulate the indigenous microbial population. The reactor degraded 1,4-D from 60 µg/L to 95% removal for 1,4-D and 1,2-DCA and >90% removal for TCE. High treatment efficiencies for 1,4-D and all co-contaminants were sustained even without propane and oxygen addition for a 2-week period.

Research

DEVELOPMENT OF AN INTEGRATED FIELD TEST/MODELING PROTOCOL FOR EFFICIENT IN SITU BIOREMEDIATION DESIGN AND PERFORMANCE UNCERTAINTY ASSESSMENT

Abriola, L.M., N.L. Capiro, J.A. Christ, L. Chu, E.L. Miller, and K.D. Pennell.
SERDP Project ER-2311, 301 pp, 2019

This research project developed and demonstrated a remediation design and performance assessment protocol to assess the suitability of a remediation technology and predict remedial performance and its associated uncertainty. This protocol couples characterization of the contaminant source with down-hole treatability testing and mathematical modeling. Project results were integrated into a source zone remediation feasibility framework that provides an efficient method to perform site characterization and obtain screening-level forecasts of site behavior, with and without the implementation of treatment remedies. Application of the framework to a realistic synthetic field scenario demonstrated its feasibility and potential benefits during conceptual site model refinement and remedial site management. https://www.serdp-estcp.org/content/download/49444/471415/file/ER-2311%20Final%20Report.pdf

DEFLUORINATION OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFASS) WITH HYDRATED ELECTRONS: STRUCTURAL DEPENDENCE AND IMPLICATIONS TO PFAS REMEDIATION AND MANAGEMENT

Bentel, M.J., Y. Yu, L. Xu, Z. Li, B.M. Wong, Y. Men, and J. Liu.
Environmental Science and Technology 53:3718-3728(2019)

Researchers investigated critical structure-reactivity relationships within 34 representative PFASs undergoing defluorination with UV-generated hydrated electrons. Cross-comparison of experimental results, including different rates of decay and defluorination of specific PFAS categories, the incomplete defluorination from most PFAS structures, and the achievement of 100% defluorination from CF_3COO^-, afforded new mechanistic insights into PFAS degradation.

The findings provide information for developing treatment processes and technologies to destroy a wide range of PFASs and for designing fluorochemical formulations that might be less likely to release recalcitrant PFASs to the environment. https://pubs.acs.org/doi/pdf/10.1021/acs.est.8b06648?rand=j0lpbe8z. *See slides for more information* https://www.ideals.illinois.edu/bitstream/handle/2142/103970/Liu_Jinyong_ECEC19.pdf?sequence=2&isAllowed=y.

REMEDIATION OF HEAVY METAL CONTAMINATED SOIL BY ASYMMETRICAL ALTERNATING CURRENT ELECTROCHEMISTRY
Xu, J., C. Liu, P.-C. Hsu, J. Zhao, T. Wu, J. Tang, K. Liu, and Y. Cui.
Nature Communications 10:2440(2019)

This study presents a remediation method design and demonstration using asymmetrical alternating current electrochemistry to achieve high degrees of contaminant removal for copper, lead, and cadmium at different initial concentrations (from 100 to 10,000 ppm). Soils reached regulatory levels for a residential scenario within a reasonable treatment time (from 30 min to 6 h). Excessive nutrient loss in treated soil was not observed, and no secondary toxic products were produced. https://www.nature.com/articles/s41467-019-10472-x.pdf

FERRATE(VI) BASED CHEMICAL OXIDATION FOR THE REMEDIATION OF AGED PCB CONTAMINATED SOIL: COMPARISON WITH CONVENTIONAL OXIDANTS AND STUDY OF LIMITING FACTORS
Monfort, O., M. Usman, I. Soutrel, and K. Hanna.
Chemical Engineering Journal 355:109-117(2019)

This study tested the efficiency of ferrate(VI) (FeVI) to degrade PCBs in contaminated soil under various experimental conditions. Integrating Fe(VI) and conventional oxidants improved degradation efficiency, which was highest (40% removal) using Fe(VI)/HSO_5^-. To evaluate if soil factors limit PCB degradation, the role of carbonate content, overall soil matrix, and PCB availability was assessed. An increase in PCB availability improved treatment efficiency (45% removal by Fe(VI) alone). Results indicated that Fe(VI) displayed higher suitability and efficiency for PCB remediation as compared to the conventional oxidants. The study also proposes potential degradation mechanisms. *See the manuscript version of this paper at* https://hal-univ-rennes1.archives-ouvertes.fr/hal-01905110/document

PHYTOFORENSICS: TREES AS BIOINDICATORS OF POTENTIAL INDOOR EXPOSURE VIA VAPOR INTRUSION
Wilson, J.L., V.A. Samaranayake, M.A. Limer, and J.G. Burken.
PLoS ONE 13(2): e0193247(2018)

Researchers analyzed PCE in tree-core samples collected at the Southeast Contamination Site in York, Nebraska, and then correlated results with groundwater, soil, soil-gas, indoor-air, and sub-slab PCE concentrations. Strong correlations between soil-gas, sub-slab, and indoor-air PCE concentrations and an interpolated tree-core PCE concentration surface indicated that trees can be valid indicators of potential vapor intrusion and human exposure to subsurface environment pollutants. The study used fewer than 60 trees in the vicinity of the source area and required ~12 hours of tree-core sampling with minimal equipment at the site to delineate vapor intrusion potential in the study area. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5815607/pdf/pone.0193247.pdf

A REVIEW ON THE SUSTAINABILITY OF THERMAL TREATMENT FOR CONTAMINATED SOILS
Ding, D., X. Song, C. Wei, and J. LaChance.
Environmental Pollution [Published online 1 Jul 2019 prior to print]

This study analyzed scientific literature to evaluate the sustainability potential of thermal treatment technology. Results suggest that well-designed coupled technologies can improve contaminant availability and removal efficiency, suppress toxic byproduct production, and reduce required heating temperature and energy input. Sustainability is discussed from the view of energy efficiency and land reuse. Restoration strategies are proposed for the recovery of soil health. The review concludes with an outlook on future research efforts that further shift thermal treatment toward sustainable remediation.

KINETICS OF PCB MICROBIAL DECHLORINATION EXPLAINED BY FREELY DISSOLVED CONCENTRATION IN SEDIMENT MICROCOSMS
Needham, T.P., R.B. Payne, K.R. Sowers, and U. Ghosh.
Environmental Science & Technology 53(13):7432-7441(2019)

This study used passive dosing/sampling to predict and measure the biological dechlorination rate of PCB 61 to PCB 23 by an organohalide-respiring bacterium, *Dehalobium chlorocoercia*. The rate of dechlorination was linearly dependent on the freely dissolved concentration of PCB 61 both in sediment and in sediment-free microcosms. The observed rate of dechlorination in sediment microcosms was predicted within a factor of 2 based on the kinetics measured in sediment-free microcosms. A threshold for dechlorination was not observed down to an aqueous concentration of about 1 ng/L PCB 61.

IMPACT OF DISSOLVED ORGANIC MATTER ON MERCURY AND METHYLMERCURY SORPTION TO ACTIVATED CARBON IN SOILS: IMPLICATIONS FOR REMEDIATION
Schwartz, G.E., J.P. Sanders, A.M. McBurney, S.S. Brown, U. Ghosh, and C.C. Gilmoura.
Environmental Science: Processes and Impacts 21:485-496(2019)

This study examined the effect of dissolved organic matter (DOM) on MeHg and Hg sorption to activated carbon (AC) using Suwannee River humic acid (SRHA) in slurry microcosms. AC significantly reduced porewater concentrations of both ambient MeHg and a fresh $Me^{199}Hg$ spike, and the addition of up to 60 mg/L SRHA did not reduce sorption to AC. The AC also reduced ambient Hg and ^{201}Hg porewater concentrations, but as SRHA concentration increased, the magnitude of solid phase sorption decreased. Speciation modeling revealed that SRHA might have affected Hg distribution to the solid phase by reducing HgS precipitation. *See additional information on this project in a slide presentation at* https://clu-in.org/conf/tio/SRPPIR11_052019/slides/2Slide_Presentation_for_Upal_Ghosh,_Ph.D.,_University_of_Maryland_Baltimore_County.pdf.

MICROBIAL TARGETED DEGRADATION PRETREATMENT: A NOVEL APPROACH TO PREPARATION OF ACTIVATED CARBON WITH SPECIFIC HIERARCHICAL POROUS STRUCTURES, HIGH SURFACE AREAS, AND SATISFACTORY TOLUENE ADSORPTION PERFORMANCE
Zhang, W., H. Cheng, Q. Niu, M. Fu, H. Huang, and D. Ye.
Environmental Science & Technology 53(13):7632-7640(2019)

This study tested whether microbial lignocellulose decomposition pretreatment increased the adsorption capability of hierarchical porous carbon (M-AC) made from crude biomass substrate. Dynamic toluene adsorption indicated that the carbon materials with microbial pretreatment had much better adsorption performances than AC without pretreatment. The M-AC material pretreated with a cellulose-degrading microbe showed the best adsorption capacity due to well-developed micropores, whereas the M-AC material pretreated with a lignin-degrading microbe showed excellent transport diffusion due to well-developed mesopores.

General News

GUIDANCE FOR USING COMPOUND SPECIFIC ISOTOPE ANALYSIS (CSIA) TO DOCUMENT THE BIODEGRADATION AND NATURAL ATTENUATION OF RDX
Hatzinger, P., P.K van Groos, M. Fuller, and N.C. Sturchio.
ESTCP Project ER-201208, 40 pp, 2019

This project developed and validated a CSIA method to confirm and constrain rates of aerobic and anaerobic biodegradation of RDX at field sites. This technique can be utilized to provide critical data to support monitored natural attenuation as a remedy for treating this energetic in groundwater and to confirm the effectiveness of in situ enhanced bioremediation remedies when implemented.
https://serdp-estcp.org/content/download/49400/471033/file/ER-201208%20Guidance%20Document.pdf

VAPOR INTRUSION: MODELING TOOLS AND COST EFFECTIVE MITIGATION
Suuberg, E. and T. McAlary. | SERDP & ESTCP Webinar Series, Webinar #93, July 2019

SERDP and ESTCP sponsored two presentations on new vapor intrusion modeling projects. The first examined the factors responsible for reports of large, several-order-of-magnitude variations in indoor air contaminant concentrations resulting from vapor intrusion processes. A case study of the Arizona State University site adjacent to Hill AFB was presented where modeling was used to characterize VI preferential pathways. The second presentation demonstrated new tools to reduce the cost of mitigating VOC vapor and radon intrusion to buildings. This research demonstrated several new ways to assess the radius of influence of soil gas extraction wells, including vacuum, velocity, travel time, vertical flow across the floor slab, and mass removal rates to design, operate and maintain optimal systems. A summary of the testing methods and four case studies were provided.
https://www.serdp-estcp.org/Tools-and-Training/Webinar-Series/07-11-2019

THREE DECADES OF VAPOR INTRUSION ASSESSMENTS - FROM J&E MODELING TO THE CURRENT ARRAY OF TOOLS
Ettinger, R., | RemTEC Summit, February 26-28, 2019, Denver, Colorado. 35 slides, 2019

Several site-specific characteristics that influence vapor intrusion (e.g., temporal variability, spatial variability, atypical preferential pathways, building-specific

factors), and new tools to better assess these factors are presented. Consideration of the benefits and limitations of the various tools in the array of investigation techniques, along with the development of a defensible vapor intrusion site conceptual model and risk management decisions, will improve capabilities to implement protective and cost-effective vapor intrusion assessments.
https://www.remtecsummit.com/ext/resources/Static-Pages/presentations/Robert-Ettinger.pdf

U.S. EPA'S SCIENCE-BASED APPROACH TO UNDERSTANDING AND MANAGING ENVIRONMENTAL RISK FROM PFAS
Gillespie, A. | RemTEC Summit, February 26-28, 2019, Denver, Colorado. 25 slides, 2019

This presentation discusses EPA's approach to PFAS, focusing on different lines of research, development, and technical assistance work being conducted to enable EPA and their partners at the state, tribal, and community level to take action on PFAS. Work includes development and validation of laboratory analytical methods to detect and quantify PFAS in environmental media; application of computational toxicology and exposure models to better understand the potential for risk from different PFAS; development of standard toxicity reference values for use in assessing risk; and development, testing, and documentation of the efficacy and cost of different methods for treating, remediating, or otherwise reducing exposures throughout the PFAS lifecycle.
https://www.remtecsummit.com/ext/resources/Static-Pages/presentations/Andrew-Gillespie.pdf

IRON SULFIDE MINERALS AS POTENTIAL ACTIVE CAPPING MATERIALS FOR MERCURY-CONTAMINATED SEDIMENT REMEDIATION: A MINIREVIEW
Ting, Y. and H.-C. His.
Sustainability 11:1747(2019)

This review discusses the potential and advantages of using iron sulfide minerals to sequester Hg in situ in contaminated sediments. Iron sulfide minerals are common in the natural environment and have shown good effectiveness in sequestering Hg by adsorption or precipitation. *This article is* ***Open Access*** *at* https://www.mdpi.com/2071-1050/11/6/1747.

HYDROGENOTROPHIC MICROBIAL REDUCTION OF OXYANIONS WITH THE MEMBRANE BIOFILM REACTOR
Zhou, C., A. Ontiveros-Valencia, R. Nerenberg, Y. Tang, D. Friese, R. Krajmalnik-Brown, et al.
Frontiers in Microbiology 9:3268(2019)

Membrane biofilm reactor (MBfR) technology for the remediation of oxyanions, such as nitrate, perchlorate, selenate, and chromate is presented in this paper. MBfR development at bench, pilot, and commercial scales, and the mechanisms that control MBfR performance, particularly including methods for managing the biofilm's structure and function, are discussed. Examples of MBfR performance for cases of treating single and co-occurring oxyanions in different types of contaminated water are also provided. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6335333/pdf/fmicb-09-03268.pdf

NEXT-GENERATION MULTIFUNCTIONAL CARBON-METAL NANOHYBRIDS FOR ENERGY AND ENVIRONMENTAL APPLICATIONS
Wang, D., N.B. Saleh, W. Sun, C.M. Park, C. Shen, N. Aich, W.J.G.M. Peijnenburg, et al.
Environmental Science & Technology 53(13):7265-7287(2019)

This review highlighted the altered and newly emerging properties of carbon-metal nanohybrids (CMNHs) and illustrates how their properties and functions direct their performances in energy harvesting, water treatment, and environmental sensing and in situ nanoremediation. The review identifies knowledge gaps and future research directions for maximizing the benefits of next-generation multifunctional CMNHs at the energy-water-environment nexus and beyond.

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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