Technology Innovation News Survey

Entries for July 1-15, 2020

Market/Commercialization Information

SAVANNAH RIVER SITE OPERATIONS ACQUISITION
U.S. DOE, Office of Environmental Management Consolidated Business Center, Cincinnati.
Contract Opportunities at Beta.SAM, Solicitation 89303320REM000076, 2020

This notice is issued for the purpose of conducting market research. U.S. DOE's Office of Environmental Management is currently in the planning stage for the Savannah River Site (SRS) Operations Acquisition. The SRS, a 310 square mile site located in the sand hills region of South Carolina, encompasses parts of Aiken, Barnwell and Allendale counties and is bordered on the west by the Savannah River and Georgia. The prospective contract (NAICS code 562910) will result in the successful operation of SRS to continue programs to complete environmental cleanup, achieve nuclear materials management, and support nuclear weapons stockpile and nonproliferation requirements at one-of-a-kind facilities at SRS. The current contract's period of performance ends September 30, 2021 (total value ~$14.7B). One 12-month option remains on the contract. DOE's EM Consolidated Business Center has created a procurement website at https://www.emcbc.doe.gov/seb/SRSOperations/. Parties interested in this future procurement are invited to submit a capability statement, 15 pages max. Responses are due by 3:00 PM ET on August 26, 2020. https://beta.sam.gov/opp/a9fc992539f44338be6dcee9e7d541d3/view

MEGA UR ARCHITECT-ENGINEER SERVICES MATOC
Dept of the Army, W071 Engineering District Kansas City, MO.
Contract Opportunities at Beta.SAM, Solicitation W912DQ20R3014, 2020

This request for submittal of SF330 packages is unrestricted and open to all businesses regardless of size under NAICS code 541330. The work will be located within EPA Region 2 and the USACE Kansas City, Omaha, and Seattle district boundaries, with the majority of the work in EPA Region 2. The Government intends to award contracts to five firms that will share $225M in total contract capacity. Projects are typically completed in phases, such as preliminary assessment, remedial investigation, feasibility study, design, engineering during construction, post-construction long-term operations or monitoring, and post-construction optimization or modifications to existing systems and remedies. The period of performance for each contract will include a base period of five years and a 2-year option period. Task order assignments (either fixed-price or cost-plus-fixed-fee) will be determined with consideration of each firm's specialized experience and technical competence, professional qualifications, past performance, knowledge of locality, and capacity. The maximum award of any task order shall not exceed $20M. SF330 packages are due by 2:00 PM CT on September 1, 2020. https://beta.sam.gov/opp/523aa5b5f5364bcb88355f7925dce1d0/view

LOW OBSERVABLE/NO COLLATERAL DAMAGE NEUTRALIZATION OF UNDERWATER MINES AND WATERBORNE IMPROVISED EXPLOSIVE DEVICES
Office of Naval Research, Contract and Grants Awards Management Division, Arlington, VA.
Contract Opportunities at Beta.SAM, Solicitation N00014-20-S-B003, 2020

Via this broad agency announcement the Office of Naval Research (ONR) invites the submission of white papers and full proposals for development of advanced technologies for low-observable/no-collateral damage neutralization of underwater mines and waterborne improvised explosive devices (WBIEDs). ONR seeks to develop and demonstrate advanced BAA-6 payloads that enable neutralization of underwater mines and WBIEDs without causing them to explode. A diver or remotely operated vehicle will deliver these payloads. Technologies developed will transition to the existing Explosive Ordnance Disposal Maritime Expeditionary Standoff Response program of record, which will field underwater capabilities required to counter naval mines, WBIEDs, and other UXO threats in the undersea and littoral marine environments. Technical considerations for white papers and proposals are listed under three separate topic areas. Responses are due by 3:00 PM ET on October 14, 2020. https://beta.sam.gov/opp/273c635d6daf4ea5a9169c2f0b8191cf/view

RESEARCH TO ACTION: ASSESSING AND ADDRESSING COMMUNITY EXPOSURES TO ENVIRONMENTAL CONTAMINANTS (R01 CLINICAL TRIAL OPTIONAL)
National Institutes of Health, Funding Opportunity RFA-ES-20-002, 2019

This announcement encourages applications for projects that use community-engaged research methods to investigate the potential health risks of environmental exposures of concern to the community and to implement an environmental public health action plan based on research findings. The overall goal is to inform changes, support efforts to prevent or reduce exposure to harmful environmental exposures, and improve the health of a community. The closing date for applications is December 4, 2020. https://www.grants.gov/web/grants/view-opportunity.html?oppId=322318 Link to additional information: http://grants.nih.gov/grants/guide/rfa-files/RFA-ES-20-002.html

F -- NATIONWIDE LOW-LEVEL MIXED LOW-LEVEL WASTE TREATMENT SERVICES
U.S. DOE, Environmental Management Consolidated Business Center, Cincinnati, OH.
Contract Opportunities at Beta.SAM, Solicitation 89303320REM000060, 2020

For its nationwide low-level and mixed-low-level radioactive waste treatment services contract, DOE intends to issue one or more basic ordering agreements in or around the first quarter of FY 2021. When the solicitation is released, the RFP will be issued on a full-and-open, unrestricted basis under NAICS code 562211 (Hazardous Waste Treatment and Disposal), size standard $35.5M. Period of performance will be five years from date of issuance with no associated option periods. Firm-fixed-price, fixed-unit-rate, and time-and-materials task orders will be issued for treatment of specific waste types and quantities. Services to be provided are set to include (1) treatment of radioactive waste for final compliant disposition of liquid, solid, sludge, and/or gaseous low-level waste (LLW) and mixed LLW, including high gram quantities that could also contain TSCA chemicals, such as PCBs, and (2) the performance of other ancillary waste services, including bulk survey for release materials. A dedicated webpage has been established for this procurement at https://www.emcbc.doe.gov/SEB/waste_treatment_services/. Although release of the final RFP is currently anticipated to occur in August 2020, this information is subject to further change based on continued COVID-19 impacts. https://beta.sam.gov/opp/af66c395e1154a4780ec80d6d26bb29/view

Cleanup News

3RD SEMIANNUAL VOLUNTARY REMEDIATION PROGRAM PROGRESS REPORT FORMER GEORGIA DEPARTMENT OF TRANSPORTATION DISTRICT 4 MAINTENANCE HEADQUARTERS AND LOTT LUMBER PROPERTY
Georgia Department of Transportation, 520 pp, 2019

Previous activities at the District 4 Maintenance Headquarters site, including wood preserving, asphalt manufacturing, heavy equipment and vehicle repairs, sign manufacturing, and painting, contaminated groundwater with benzene, toluene, ethylbenzene, xylenes (BTEX) and PAHs. Two in situ chemical oxidation events in support of monitored natural attenuation were conducted, injecting a total of ~166,340 gals of modified Fenton's reagent across an area of ~83,900 ft² in the subsurface. Naphthalene and benzene were chosen as representative contaminants to monitor due to their mobility in groundwater. Based on an overview of available data, ISCO injections were successful at reducing the extent and concentration of the dissolved benzene and naphthalene groundwater plumes. https://epd.georgia.gov/document/document/progress-report-42/download

VOLUNTARY REMEDIATION PROGRAM REVISED COMPLIANCE STATUS REPORT FORMER VOGUE CLEANERS COLUMBIA SQUARE SHOPPING CENTER MARTINEZ, COLUMBIA COUNTY, GEORGIA
Georgia Environmental Protection Division, 532 pp, 2019

Vogue Cleaners operated from 1976 until 1997, contaminating soil and groundwater at the site with PCE and its daughter products. Previous remedial activities included soil removal, chemical injections of hydrogen release compound, an ART™/soil vapor extraction, a 24-hour enhanced fluid recovery (EFR) dual-phase extraction event, and in situ chemical oxidation. In 2018, a 30-day long-term EFR was conducted in one recovery and one monitoring well. During the event, >267,100 gals of impacted groundwater were extracted and treated before being discharged offsite. The long-term EFR, in conjunction with the previous remedial efforts, resulted in a significant reduction of PCE and associated chemicals across the site. Given that the site does not otherwise pose an imminent or substantial danger to human health and the environment, upon approval from the Georgia Environmental Protection Division, the site will undergo closure activities. https://epd.georgia.gov/document/document/csr-20/download

REMEDIATION OF A PETROLEUM HYDROCARBON-CONTAMINATED SITE BY SOIL VAPOR EXTRACTION: A FULL-SCALE CASE STUDY
Labianca, C., S. De Gisi, F. Picardi, F. Todaro, and M. Notarnicola.
Applied Sciences 10(12):4261(2020)

A soil vapor extraction system was employed to remediate a petroleum hydrocarbon-contaminated industrial site in Taranto, Southern Italy. The project assessed the efficiency of the full-scale remediation system and the influence of parameters affecting the treatment system's effectiveness. VOC concentration in soil was reduced by 73% after four years of treatment. Some soil samples did not reach the environmental threshold limits, requiring an extension of the remediation period. The soil texture, humidity, permeability, and the category of considered pollutants were found to influence the amount of total extracted VOCs. *This article is* ***Open Access*** *at* https://www.mdpi.com/2076-3417/10/12/4261/htm

PERFORMANCE OF THE NATURAL RECOVERY COMPONENT OF THE UPPER HUDSON RIVER REMEDY
DeSantis, L., J. Benaman, K. Ballou, C. Yates. J. Connolly, and R. Gibson.
International Conference on the Remediation and Management of Contaminated Sediments, 11-14 February, New Orleans, Louisiana, 19 slides, 2019

The selected remedy in the 2002 Record of Decision for the Hudson River Superfund site included the removal of PCB-contaminated sediment (followed by capping or backfilling) and monitored natural recovery (MNR) of the remaining PCBs. After dredging was completed in 2015, long-term monitoring of fish, water, and surface sediments for PCBs began on a schedule of every five years for the foreseeable future to track recovery of the river. In the most recent assessment, surface sediment data collected from 2002 through 2005 in areas not targeted for removal were compared to surface sediment data collected in 2016 and 2017. Declines in total PCB and tri+ PCB concentrations were greatest upstream near the original PCB source and generally decreased with distance downstream. Declines were influenced by accounting for different sediment types among sampling locations and programs, including abandoned locations in PCB calculations. Results suggest that the natural recovery component of the remedy is functioning, and support continued monitoring to assess long-term trends. https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/h3_-mnr-and-enhanced-mnr/h3_1325_-420_desantis.pdf?sfvrsn=cabc9ffe_2 *Longer abstract:* https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/h3_-mnr-and-enhanced-mnr/420.pdf?sfvrsn=36e75a29_2 *Record of Decision:* https://www3.epa.gov/hudson/RecordofDecision-text.pdf

MONITORED NATURAL RECOVERY EVALUATION OF COTTONWOOD BAY SEDIMENTS (DALLAS, TX)
Bell, K.S., P. Fuchsman, L. Brown, V. Magor, and C. Epperson.
International Conference on the Remediation and Management of Contaminated Sediments, 11-14 February, New Orleans, Louisiana, 23 slides, 2019

The original remedy for the Cottonwood Bay site was dredging to address PCB-contaminated sediments. However, 2014 surface sediment sampling results and an initial evaluation of monitored natural recovery (MNR) processes suggested that current surface sediment conditions at the site were approaching site-specific performance targets. The site was revisited to evaluate MNR performance and determine whether MNR could achieve remedial goals within a reasonable timeframe. The evaluation was conducted using multiple lines of evidence and historical and new data. Findings were combined with previous assessments to create a comprehensive conceptual site model that characterized and quantified MNR processes at the site. This presentation discusses the data used to demonstrate MNR processes and long-term stability and monitoring of the remedy. The state agency has since partially approved a revised remedial action plan that relies on MNR as the selected remedy. https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/h3_-mnr-and-enhanced-mnr/h3_1300_-120_bell.pdf?sfvrsn=fb815bb2_2 *Longer abstract:* https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/h3_-mnr-and-enhanced-mnr/120.pdf?sfvrsn=1845d7d6_2

Demonstrations / Feasibility Studies

FINAL REPORT DEMONSTRATION AND VALIDATION OF THE HORIZONTAL REACTIVE MEDIA TREATMENT WELL (HRX Well®) FOR MANAGING CONTAMINANT PLUMES IN COMPLEX GEOLOGIC ENVIRONMENTS
Divine, C., M. Crimi, and J.F. Devlin. ESTCP Project ER-201631, 186 pp, 2020

The HRX Well was field-validated at Site 003 at Vandenberg Air Force Base in California. TCE was treated in the well abiotically with zero-valent iron. Total TCE mass discharge reduction was >99.99 % relative to the upgradient well. Significant biologically mediated treatment also occurred, facilitated by the residual guar-based biopolymer drilling fluid. After 436 days, decreases from 50-74% in TCE were observed at four downgradient monitoring wells, and the timing of the first arrival of treated water was consistent with model predictions. For this site, estimated lifecycle HRX Well costs were lower than costs for permeable reactive barrier and pump-and-treat alternatives. http://www.environmentalrestoration.wiki/images/e/ec/Divine2020_ER201631.pdf

"A-STREET DITCH" SEDIMENT REMEDIATION PILOT STUDY - WILMINGTON
Delaware Department of Natural Resources and Environmental Control, 5 pp, 2019

The A-Street Ditch drains to the South Wilmington Wetland to the Christina River and serves as a pathway/source of PCBs. In conjunction with remedial activities within the wetland, a full-scale pilot project was initiated to minimize recontamination of the wetland by surface water and sediments moving tidally through the system. The pilot is utilizing SediMite™ with the addition of PCB-destroying inoculant to sequester and degrade PCBs in the sediment. The pilot will determine the rate at which PCB degradation/destruction can occur in this system with the added inoculant and whether the technology could be applied at a larger scale. Results of the initial 5-month post-remediation monitoring indicated that total PCB concentrations in surficial sediments, surface water, and porewater dropped by an average of ~25%, ~35%, and~67%, respectively. Additional post-remediation monitoring is scheduled for one year (June 2020) and three years (June 2022) post-application. http://www.dnrec.delaware.gov/dwhs/SIRB/Documents/A%20Street%20Ditch%20Pilot%20Study%20Fact%20Sheet_Final.pdf *See YouTube video for a summary of the project:* https://www.youtube.com/watch?v=3tcV6vym1BY

ACTIVELY SHAKEN IN SITU DEPLOYMENT: AN INNOVATIVE APPROACH TO ACCELERATE EQUILIBRIUM IN PASSIVE SAMPLERS
Jalalizadeh, M., J. Conder, M. Healey, and U. Ghosh.
International Conference on the Remediation and Management of Contaminated Sediments, 11-14 February, New Orleans, Louisiana, 19 slides, 2019

A robust and inexpensive platform was developed that integrates a vibration device and can be adapted to an existing commercially-available vibrating passive sampler in various configurations. The device was evaluated using polyethylene passive samplers impregnated with performance reference compounds (PRCs) in marine sediment for 7-14 days to demonstrate the device performance and evaluate the increase in sampling rates due to the vibration. Periodic vibration of the samplers with the frequency of 4-hr pause and 5-sec pulse greatly enhanced the mass transfer of PCBs/PRCs into/out of the passive samplers compared to the static deployment even after seven days. The initial design remained stable and waterproof, and there was no need to recharge the battery or service the device during deployment. https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/e2_-passive-samplers/e2_1505_-46_jalalizadeh.pdf?sfvrsn=8a6c527b_2 *Longer abstract:* https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/e2_-passive-samplers/46.pdf?sfvrsn=2710ef1f_2 *See SERDP Project for initial project results:* https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Sediments/Bioavailability/ER-2540

EVALUATING A NEW INJECTION METHOD OF LIQUID/GAS MIXTURE SPRAY INJECTION VIA PERFORMING LONG-TERM IN SITU BIOREMEDIATION TESTS
Han, K., S. Park, S. Kwon, and Y. Kim.
Journal of Environmental Management 268:110691(2020)

Field tracer tests were conducted using single-well push-pull tests, single-well natural gradient drift tests, and long-term in situ well-to-well tests to develop and evaluate a new method of liquid/gas mixture spray injection. The method was created to alleviate biological clogging issues experienced when injecting growth substrates during in situ bioremediation. The method had several advantages compared to a traditional solution injection method, including transport of solute to a larger proportion of an aquifer by a factor of 1.3-1.7, application of higher shear stress onto the surface of soil particles by a factor of 4.2-5.0, faster biofilm sloughing rates by a factor of 2.3-2.6, a reduction in the ratio of the volume

occupied by microorganisms to total pore volume, and efficient TCE dechlorination for 550 days without any injection problems.

USE OF NATURAL SEDIMENTS TOWARDS ENHANCED MONITORED NATURAL RECOVERY
Rosen, G., I. Rivera-Duarte, J. Carilli, M. Colvin, B. Chadwick, J. Conder, D. Moore, et al.
International Conference on the Remediation and Management of Contaminated Sediments, 11-14 February, New Orleans, Louisiana, 24 slides, 2019

The Department of the Navy and Army have recently invested in the practical application of true enhanced monitored natural recovery (tEMNR), using clean dredge materials (DM) as a potentially cost-effective and beneficial use alternative to cap contamination and facilitate natural recovery. tEMNR is being tested at pilot-scale at the Pearl Harbor Naval Shipyard, which is contaminated with PCBs and metals and is undergoing EMNR. The project utilized remedy and recontamination assessment (RARA) arrays equipped with passive samplers. The arrays also measured several endpoints, including bulk chemistry, ex situ bioaccumulation, benthic community recolonization, sediment deposition, cap stability/sediment mixing, and water chemistry during the pilot test. Three arrays, each housing six treatment cells, were placed at ~40 ft below surface. Cells were loaded with homogenized site sediment under either clean sand, AquaGate +PAC™, low carbon DM, high carbon DM, or no treatment. Available PCB reduction in surface sediments varied across treatments after 10 months in the following order: activated carbon (92%)>high carbon DM (76%)>clean sand (74%)>low carbon DM (65%). The presentation also includes results from the endpoints measured during the pilot.
https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/h3_-mnr-and-enhanced-mnr/h3_1415_-134_rosen_pdf?sfvrsn=a2b363ff_2 *Longer abstract:*
https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/h3_-mnr-and-enhanced-mnr/134.pdf?sfvrsn=2dff4f35_2 *See SERDP Project for RARA development and initial project results:*
https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Sediments/Stormwater/ER-2537

Research

STATEWIDE ASSESSMENT OF KARST AQUIFERS IN NEW YORK WITH AN INVENTORY OF CLOSED-DEPRESSION AND FOCUSED-RECHARGE FEATURES
Kappel, W.M., J.E. Reddy, and J.C. Root, U.S. Geological Survey (USGS) in cooperation with the New York State Department of Environmental Conservation, Scientific Investigations Report 2020-5030, 86 pp, 2020

The New York State Department of Environmental Conservation (NYSDEC) and Department of Health (NYSDOH) are concerned about groundwater contamination in the karst aquifers of New York State, especially relating to the unintended introduction of industrial contaminants or agricultural contaminants. The NYSDEC and NYSDOH are collaborating with the agricultural community to make farmers and farm-planning advisors more aware of karst and how to manage daily farming activities to reduce their impact on surface water and groundwater resources, especially in karst areas. USGS compiled an inventory of closed depressions from statewide digital contour data, scanned 7.5-minute topographic, and light detection and ranging (lidar) digital elevation models. This report provides information on the location of karst bedrock and associated closed depressions that focus surface water recharge to groundwater in karst areas across New York. The report also provides examples of why it is important to carefully manage and protect this resource. https://pubs.usgs.gov/sir/2020/5030/sir20205030.pdf

HIGH RESOLUTION DELINEATION OF CONTAMINANT CONCENTRATIONS, BIOGEOCHEMICAL PROCESSES, AND MICROBIAL COMMUNITIES IN SATURATED SUBSURFACE ENVIRONMENTS
Jackson, A. and P.B. Hatzinger, SERDP Project ER-2419, 139 pp, 2020

The primary objective of this SERDP research was to develop and demonstrate a High-Resolution Passive Profiler as a fine-scale delineation tool for the saturated subsurface. Focus was placed on discerning contaminant, microbiological, and biogeochemical differences between low permeability and high permeability zones within heterogeneous or stratified media.https://www.serdp-estcp.org/content/download/51606/507329/file/ER-2419%20Final%20Report.pdf

EXTENDING THE APPLICABILITY OF COMPOUND-SPECIFIC ISOTOPE ANALYSIS TO LOW CONCENTRATIONS OF 1,4-DIOXANE PHASE II
Bennett, P. and R. Aravena, SERDP Project ER-2535, 14 pp, 2020

This study builds upon results from Phase 1 (https://www.serdp-estcp.org/content/download/47014/440610/file/ER-2535%20Final%20Report%20-%20Phase%201.pdf) to increase the database of stable isotopic composition of neat 1,4-dioxane sources by 10 to improve interpretation of field data and increase the number of field sites where compound-specific isotope anlysis is applied to low concentrations of 1,4- dioxane in groundwater at DoD sites.
https://www.serdp-estcp.org/content/download/51601/507287/file/ER-2535%20Executive%20Summary%20Phase%201I.pdf

USING FUNGI TO CLEAN UP CONTAMINATED SOIL
National Institute of Environmental Health Sciences, Research Brief 308, 2 pp, 2020

Duke researchers validated a strategy to detect existing onsite fungal communities that can grow in soil with high PAH levels. Researchers collected creosote-contaminated soil samples from the Holcomb Creosote Superfund Site, a former wood treating facility. PAH concentrations varied widely, ranging from 307 ng/g to 26,196 ng/g of soil. They also extracted and analyzed DNA in each sample to identify fungi present in the soil. When focusing on specific groups of fungi, they found that PAH tolerance was more common than PAH sensitivity in the fungal community and that overall fugal diversity was not affected by the presence of PAHs. They also identified PAH-tolerant fungal groups that are closely related to known PAH degraders, suggesting these fungi may be good targets for stimulating the soil community to degrade PAHs. https://tools.niehs.nih.gov/srp/1/ResearchBriefs/PDFs/SRP_ResearchBrief_308_508.pdf

RESOLVING ATMOSPHERIC MERCURY LOADING AND SOURCE TRENDS FROM ISOTOPIC RECORDS OF REMOTE NORTH AMERICAN LAKE SEDIMENTS
Lepak, R.F., S.E. Janssen, D.R. Engstrom, D.P. Krabbenhoft, M.T. Tate, R. Yin, et al.
Environmental Science & Technology 54(15):9325-9333(2020)

Changes in natural Hg isotope records are described from a suite of dated sediment cores collected from various remote lakes of North America. In nearly all cases, the rise in industrial-use Hg was accompanied by an increase in δ^{202}Hg and Δ^{199}Hg values, which were attributed to large-scale industrial emission of Hg into the atmosphere. Observations were consistent with positive Δ^{199}Hg values measured in modern-day precipitation and modeled increases in δ^{202}Hg values from global emission inventories. Despite similar temporal trends among cores, the baseline isotopic values vary considerably among the different study regions, likely attributable to differences in the fractionation produced in situ as well as differing amounts of atmospherically delivered Hg.

IN SITU-GENERATED REACTIVE OXYGEN SPECIES IN PRECHARGED TITANIA AND TUNGSTEN TRIOXIDE COMPOSITE CATALYST MEMBRANE FILTERS: APPLICATION TO AS(III) OXIDATION IN THE ABSENCE OF IRRADIATION
Park, J., J. Lim, Y. Park, D.S. Han, H.K. Shon, M.R. Hoffmann, and H. Park.
Environmental Science & Technology 54(15):9601-9608(2020)

In situ-generated reactive oxygen species created in pre-photocharged TiO_2 and WO_3 (TW) composite particle-embedded inorganic membrane filters efficiently oxidized As(III) to As(V) without any auxiliary chemical oxidants, under ambient conditions, and in the dark.

A CASE STUDY OF ORGANIC MICROPOLLUTANTS IN A MAJOR SWEDISH WATER SOURCE — REMOVAL EFFICIENCY IN SEVEN DRINKING WATER TREATMENT PLANTS AND INFLUENCE OF OPERATIONAL AGE OF GRANULATED ACTIVE CARBON FILTERS
Troger,R., S.J. Kohler, V. Franke, O. Bergstedt, and K. Wiberg.
Science of the Total Environment 706:135680(2020)

A wide range of organic micropollutants that includes PFAS and pesticides were analyzed in water samples from the Gota Alv River. In total, 27 organic micropollutants were detected at individual concentrations as high as 54 ng/L, and total concentrations increased with distance downstream. Samples also were collected of raw and finished water from seven drinking water treatment plants and a treatment plant that employs six granulated active carbon filters of varying operational ages. Removal efficiency was higher in treatment plants that employed granulated active carbon filters or artificial infiltration compared with those that used a more conventional treatment strategy. Removal was also strongly affected by the operational age of the carbon filters. Breakthrough in the carbon filters occurred in the order of dissolved organic carbon, PFAS, and other organic micropollutants. Adding fresh granulated active carbon improved the removal of hydrophobic organic compounds, particularly dissolved organic carbon and PFAS. https://pub.epsilon.slu.se/16650/1/troger_et_al_200318.pdf

RECENT SCIENCE TO SUPPORT LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL) REMEDIATION DECISION MAKING AT PETROLEUM UST SITES
Lahvis, M. | RemTech 2019: Remediation Technologies Symposium, 16-18 October, Banff, 26 slides, 2019

A statistical evaluation of maximum benzene and MTBE concentrations at 3,225 petroleum underground storage tank (UST) sites was undertaken to understand the effects of active remediation. In general, free-phase LNAPL sites exhibited higher maximum concentrations in groundwater and slower attenuation rates relative to sites with residual-phase LNAPL. Attenuation rates were poorly correlated with LNAPL thickness, indicating that reductions in in-well thickness had limited effect on the plume longevity. The median source attenuation rate was 0.18/year for benzene and 0.36/year for MTBE, corresponding to half-lives of 3.9 and 1.9 years, respectively. Groundwater concentrations generally decreased over time irrespective of remediation technology, implying that for most sites, decreasing concentration trends were more related to other factors, such as natural attenuation. https://www.esaa.org/wp-content/uploads/2019/10/19-Lahvis.pdf

CHARACTERIZING AND COMPARING PER- AND POLYFLUOROALKYL SUBSTANCES IN COMMERCIALLY AVAILABLE BIOSOLID AND ORGANIC NON-BIOSOLID-BASED PRODUCTS
Lazcano, R.K., Y.J. Choi, M.L. Mashtare, and L.S. Lee
Environmental Science & Technology 54(14):8640-8648(2020)

Thirteen commercially-available biosolid-based products, six organic composts, and one food and yard waste compost were tested for the occurrence of 17 PFAAs. PFAA concentration ranges observed were: biosolid-based products (9.0-199 µg/kg) > food and yard waste (18.5 µg/kg) > other organic products (0.1-1.1 µg/kg). Analysis of 2014, 2016, and 2018 bags produced from one product line showed a temporal decrease in the total PFAAs (181, 101, and 74 µg/kg, respectively). The total oxidizable precursor (TOP) assay revealed the presence of PFAA precursors in the biosolid-based products at much higher levels when the soluble carbon was removed prior to the TOP assay. Time-of-flight mass spectrometry confirmed the presence of three sulfonamides, two fluorotelomer sulfonates, and several polyfluoroalkyl phosphate diesters. Porewater concentrations of water-saturated products were primarily of short-chain PFAAs and increased with increasing PFAA concentrations in the products. A strong positive log-linear correlation between organic carbon (OC)-normalized PFAA partition coefficients and the number of CFn units indicates that OC is a good predictor of PFAA release concentrations.

General News

QUANTIFYING THE EFFICIENCY AND SELECTIVITY OF ORGANOHALIDE DECHLORINATION BY ZERO-VALENT IRON
He, F., L. Gong, D. Fan, P.G. Tratnyek, and G.V. Lowry.
Environmental Science: Processes & Impacts 22:528-542(2020)

Several types of efficiencies of zero-valent iron-based treatments for organohalide contaminated groundwater are reviewed, including (i) the efficiency of Fe(0) utilization, $\varepsilon_{Fe(0)}$, (ii) the electron efficiency of target contaminant reduction, ε_e, and (iii) the electron efficiency of natural reductant demand (NRD) involving H_2O, O_2, and co-contaminants such as nitrate, ε_{NRD}.

A REVIEW ON DESIGN, MATERIAL SELECTION, MECHANISM, AND MODELLING OF PERMEABLE REACTIVE BARRIER FOR COMMUNITY-SCALE GROUNDWATER TREATMENT
Thakur, A.K., M. Vithanage, D.B. Das, and M. Kumar.
Environmental Technology & Innovation 19:100917(2020)

Few groundwater remediation technologies have successfully been implemented at a community or regional scale due to issues such as longevity and skilled laborers. This review discusses implementing permeable reactive barriers (PRBs) on a regional scale and their capability to replace several existing groundwater treatment methods. The review compares PRBs with conventional treatment methods, lists potential adsorbents, discusses key mechanisms of contaminant degradation/removal, and lists future research perspectives.

SULFATE RADICALS-BASED ADVANCED OXIDATION TECHNOLOGY IN VARIOUS ENVIRONMENTAL REMEDIATION: A STATE-OF-THE-ART REVIEW
Ushani, U., X. Lu, J. Wang, Z. Zhang, J. Dai, Y. Tan, S. Wang, W. Li, C. Niu, T. Cai, et al.
Chemical Engineering Journal 402:126232(2020)

Sulfate radicals have a strong oxidation potential, high reaction rate, and a long life span. This review covers current research, novel encounters, pathways of radicals in the environment, commercial implementation when compared to persulfate oxidation, challenges and practical problems faced during usage, and research needs to promote full-scale implementation.

INSIGHTS INTO THE MECHANISMS UNDERLYING THE REMEDIATION POTENTIAL OF EARTHWORMS IN CONTAMINATED SOIL: A CRITICAL REVIEW OF RESEARCH PROGRESS AND PROSPECTS
Zeb, A.. S. Li, J. Wu, J. Lian, W. Liu, and Y. Sun.
Science of the Total Environment 740:140145(2020)

Vermiremediation, using earthworms to remove contaminants from soil or help to degrade non-recyclable chemicals is an alternative, low-cost technology to treat contaminated soil, but knowledge on the mechanisms and framework to remediate organic and inorganic contamination is limited. This publication reviews research progress of soil contaminant effects on earthworms and the potential to use earthworms to remediate soil contaminated with heavy metals, PCBs, polybrominated diphenyl ethers (PBDEs), PAHs, pesticides, and crude oil. The review addresses the possible processes, mechanisms, advantages, limitations, how to boost the efficiency, and future prospects to remediate soil contamination to promote further studies and apply vermiremediation in contaminated soils.

DESCRIBING THE TOXICITY AND SOURCES AND THE REMEDIATION TECHNOLOGIES FOR MERCURY-CONTAMINATED SOIL
Teng, D., K. Mao, W. Ali, G. Xu, G. Huang, N.K. Niazi, X. Feng, and H. Zhang.
RSC Advances 10:23221-23232(2020)

A systematic review of recent developments to remediate Hg-contaminated soils was conducted. The paper introduces Hg chemistry, toxicity and the main human activity-related sources of Hg in soil, summarizes remedial technology advances to remove Hg pollution from the soil, identifies six remediation techniques, and discusses the challenges and future perspectives of remediating Hg-contaminated soils. https://pubs.rsc.org/en/content/articlepdf/2020/ra/d0ra01507e

A CRITICAL REVIEW ON ADVANCED OXIDATION PROCESSES FOR THE REMOVAL OF TRACE ORGANIC CONTAMINANTS: A VOYAGE FROM INDIVIDUAL TO INTEGRATED PROCESSES
Tufail, A., W.E. Price, and F.I. Hai. | Chemosphere 260:127460(2020)

This review briefly discusses individual advanced oxidation processes (AOPs) and their limitations in degrading trace organic contaminants (TrOCs) containing different functional groups, classifies integrated AOPs, and comprehensively explains their effectiveness for the degradation of a wide range of TrOCs.

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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