Technology Innovation News Survey

Entries for November 1-15, 2019

Market/Commercialization Information

STRATEGIC ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM CORE
U.S. Army Corps of Engineers, USACE HEC, Ft. Belvoir, Alexandria, VA.
Contract Opportunities on Beta.Sam.gov, Solicitation W912HQ20S0004, 2019

DoD's SERDP Office is interested in receiving pre-proposals from businesses both large and small for innovative research focusing on the following FY2021 Environmental Restoration and Munitions Response statements of need: **ERSON-21-C1** - Improved understanding of thermal destruction technologies for materials laden with per- and polyfluoroalkyl substances; **ERSON-21-C2** - Improved understanding of processes influencing the effectiveness and fate of particulate amendments; and **MRSON-21-C1** - Detection, classification, and remediation of millitary munitions underwater. Go to https://www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations/Non-Federal-Core-Proposal-Instructions for complete submittal instructions for this competitive funding opportunity. To be eligible for consideration, submit a pre-proposal before 2:00 PM ET on January 7, 2020. https://beta.sam.gov/opp/3f4326f7c19f4ac81a04d42004c6e0f5f/view

FENCE-TO FENCE ENVIRONMENTAL COMPLIANCE CONTRACT, VARIOUS LOCATIONS IN ALASKA AND THE PACIFIC DIVISION AOR
U.S. Army Corps of Engineers, Anchorage, Alaska.
Contract Opportunities on Beta.Sam.gov, Solicitation W911KB-20-R-0005, 2019

DoD via the U.S. Army Corps of Engineers has reissued the request for information (sources sought) originally published July 11, 2019, regarding the requirement for contractor services to provide environmental compliance support activities necessary to support U.S. Air Force and Air Force Civil Engineer Center environmental mission requirements. Draft documents as background are attached to the Contract Opportunities notice to enable business concerns to respond with comments and questions. Examples of specific services include tasks such as operating, maintaining, and optimizing pollution control; characterizing waste streams; performing environmental monitoring, sampling, and analysis; operating a hazardous waste accumulation site; inspections; and updating existing environmental plans. The majority of work will be performed at Air Force facilities in Alaska; some work may be required at other locations (e.g., Hawaii and Wake Island). The new response date for this modified sources sought is 2:00 PM Alaska Time on January 6, 2020. https://beta.sam.gov/opp/25d5176102bd4b9a92b6233752ebcccc/view

U.S. EPA REGION 2 EMERGENCY AND RAPID RESPONSE SERVICES (ERRS)
U.S. Environmental Protection Agency, Region 2 Contracting Office, Edison, NJ.
Contract Opportunities on Beta.Sam.gov, Solicitation 68HE0219R0002, 2019

This procurement is a total small business set-aside (NAICS code 562910, size standard 750 employees) to acquire Emergency and Rapid Response Services (ERRS) for sites located in the States of New York, New Jersey, and the Territories of Puerto Rico and the U.S. Virgin Islands. It is the Government's intent to award any number of performance-based IDIQ-type contracts for a maximum performance period of 60 months. The purpose of the ERRS contract is to provide fast, responsive environmental cleanup services for EPA Region 2 for release of hazardous substances/materials and petroleum products/oil or in response to natural and manmade disasters. Consistent with the EPA Clean and Greener Policy for Contaminated Sites, contractor shall explore, evaluate, and implement green cleanup strategies. The solicitation is available only on FedConnect at https://www.fedconnect.net/FedConnect/?doc=68HE0219R0002&agency=EPA. Offers are due by 4:30 PM ET on January 9, 2020. https://beta.sam.gov/opp/f9d5556386273411b7b366314ffc459a8a/view

TECHNICAL EVALUATION AND MARKET ASSESSMENT SUPPORT
U.S. Environmental Protection Agency, Cincinnati, OH.
Contract Opportunities on Beta.Sam.gov, Solicitation 68HERC19R0023, 2019

This procurement is for full and open competition, NAICS code 541611, size standard $16.5M. Through task orders issued under the performance work statement for technical evaluation and market assessment support, contractors (up to 3 contract awards) shall provide support services for EPA's Water Efficiency Program and other water efficiency and resiliency efforts, including (1) WaterSense Technical Support, (2) WaterSense Program Support and Implementation, (3) WaterSense Marketing, Communications, and Promotional Support, and (4) Support for Water Management, Sustainability, and Resiliency Efforts. This IDIQ contract is to have a performance period from the effective award date through five years for the ordering period, plus one year for completion of task orders issued during the ordering period. The maximum amount of orders for all contracts shall not exceed $18M. The Performance Work Statement is available only on FedConnect, beginning on page 94 of the file "Complete RFP 68HERC19R0023" at https://www.fedconnect.net/FedConnect/?doc=68HERC19R0023&agency=EPA. Proposals are due by 3:00 PM ET on January 9, 2020. https://beta.sam.gov/opp/92925c48c667475bbf68e3dadf5056e6/view

EPA REQUEST FOR INFORMATION 68HERH20R0007
U.S. Environmental Protection Agency, Washington, DC.
Contract Opportunities on Beta.Sam.gov, Solicitation 68HERH20R0007, 2019

U.S. EPA is aware that combining EPA's current and expired contract performance work statements (PWS) and statements of work (SOW) that support the Office of Land and Emergency Management (OLEM) into one consolidated proposed draft SOW have the potential to create organizational conflicts of interest (OCI) and impacts created by limitations on future contracting (LOFC). This request for information is being published to the entire contracting community to receive comments and questions not only about the requirements in the draft SOW but also to identify any Task Area or requirements within a Task Area that raises questions and concerns regarding potential OCI and LOFC where contractors believe they would have limitations on their ability or be prohibited entirely from being able to respond to any RFP that included the unchanged draft SOW. Responses are due by or before 5:00 PM on January 10, 2020. The purpose of the new, multiple-award IDIQ contract is to obtain a full range of services in support of the OLEM mission, its regional and field offices, and its offices of Resource Conservation and Recovery, Superfund Remediation and Technology Innovation, and Emergency Management. Period of performance: One-year base period, four one-year options, and four six-month award terms for a maximum potential performance period of seven years. https://beta.sam.gov/opp/73a31922a0a548799eb4d649e4fbf0b9/view

Cleanup News

FINAL CLOSE OUT REPORT INTEL SANTA CLARA 3 SUPERFUND SITE SANTA CLARA, CALIFORNIA
U.S. EPA Region 9, 19 pp, 2018

EPA has completed cleanup of the one-acre former Intel Santa Clara 3 Site in Santa Clara, California. In July 1982, Intel found low-level VOCs in the groundwater confined to a shallow groundwater zone below the site. In February 1985, a groundwater extraction and treatment system began operating that consisted of two extraction wells with granular activated carbon treatment and discharged treated groundwater to the San Tomas Aquino Creek. When the 1990 Record of Decision was issued, the max TCE concentration was ~100 µg/L, which was above the 5 µg/L maximum contaminant level (MCL) cleanup criteria. Several pilot studies were conducted from 1994-2005 including in situ chemical oxidation which failed to achieve MCL levels. A 2010 ROD Amendment modified the remedy to monitored natural attenuation. Further testing revealed that TCE levels still measured above the MCL in monitoring wells SC3-3Rep and SC3-1Rep. Intel conducted a pilot test using PermeOx® in September 2016. Follow-up injections were conducted around SC3-1Rep in September 2017 after TCE concentrations rebounded. After the second injection, TCE was not detected above the MCL for seven consecutive monthly monitoring events. All 18 post-injection results for well SC3-3Rep were non-detect for TCE. A trend analysis post-pilot test determined that groundwater restoration in the area of the two monitoring wells was complete and no further remedial actions were required. https://semspub.epa.gov/work/09/100013416.pdf

URBAN CREEK IMPACTED SEDIMENT REMOVAL AND ISOLATION UTILIZING A GEOSYNTHETIC CLAY LINER
Litwiller, T. and J. Ruselink.
10th International Conference on the Remediation and Management of Contaminated Sediments, 11-14 February, New Orleans, Louisiana, 21 slides, 2019

Pleasant Run Creek (PRC) is an urban stream that bisects an 87-acre former manufactured gas plant where past operations left the creek contaminated with coal tar and petroleum up to 20 ft below the creek bottom. Utilizing results from qualitative and quantitative sampling, a remedial approach was designed to mitigate potential ecological risk, including sediment removal, sediment isolation, and free product capture from upland groundwater. A geosynthetic clay liner (GCL) was chosen to remediate the creek bottom due to its isolation ability, constructability, uniform thickness upon application, and long-term viability. The project included diverting the PRC with a pump-around system and temporary dam to remove >40,000 tons of sediment in "dry" conditions and installing >220,000 ft^2 of GCL in shingled, overlapping sheets to achieve isolation between remaining impacted sediment and surface water. Features of the project's natural restoration design included pools, riffles, flood-prone benches, and boulder cross vanes to enhance the biological function of the on-site reach of PRC and provide long-term stability based upon shear stresses. The GCL included a polypropylene geofilm coating to yield a hydraulic conductivity of 5x10^{-10} cm/s while providing increased internal shear strength in steep slope and lower load applications and bedding layers of structured backfill installed above and below the GCL to protect against punctures while adding overburden pressure. The use of the GCL resulted in a consistent application and higher confidence in uniform hydraulic conductivity and transmissivity. **Longer abstract:** https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/a3_remediation-of-urban-waterways/143_pdf2sfvrsn=1bc46e79_2 **Slides:** https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/a3_remediation-of-urban-waterways/a3_1350_-143_litwiller.pdf?sfvrsn=41512924_2 *For more information on the PRC Watershed Management Plan, see* https://www.in.gov/idem/nps/3875.htm

USE OF PERMEABLE REACTIVE BARRIER TO BIOREMEDIATE A PETROLEUM HYDROCARBON GROUNDWATER PLUME
Guilfoil, D. | New England Interstate Water Pollution Control Commission National Tanks Conference, 10-13 September, Lousiville, KY, 2018

A 1980s release of gasoline at a large throughput fueling facility at an Interstate Rest Area produced an LNAPL groundwater plume that impacted a downgradient wetland area. Previous remediation efforts at the facility sufficiently addressed petroleum impact to the vadose zone, but the groundwater plume persisted. Dissolved volatile PHCs were detected in monitoring wells located at a wetland area 200 ft from underground storage tank systems. The natural reducing conditions at the wetland were exacerbated by the PHC groundwater plume resulted in the concentration of arsenic and beryllium in shallow soils. Remediation of the groundwater plume was complicated due to the active fueling operation and presence of ~25 ft of fill material overlying the saturated zone. A permeable reactive barrier (PRB) was installed orthogonal to groundwater flow ~100 feet up-gradient of the affected wetland to bioremediate the plume. A mixture of BOS 200®, calcium sulfate, and water was injected throughout the saturated zone to establish the PRB. Post-installation monitoring data indicate that the remedy is performing as designed. The conceptual site model, PRB design and installation data, and ~18 months of post-PRB installation performance monitoring were presented. http://neiwpcc.org/wp-content/uploads/2018/10/Guilfoil.pdf

Demonstrations / Feasibility Studies

LEVEL 2 REMEDIATION ACTION PLAN, AA DISCOUNT, 181 WEST KINGS HIGHWAY, CENTER HILL, FLORIDA
Florida Department of Health, 140pp, 2018

The 181 West Kings Site is an active petroleum gas and convenience store. A past discharge led to the removal of four 6,000 gal USTs, associated piping, and ~155 tons of surrounding soils in a 1500 ft^2 excavation area to a depth of 13 feet. Two new 10,000-gal USTs were installed after remediation, and the site has been in natural attenuation monitoring since April 2012. Groundwater sampling results for wells MW-5R and MW-8R in 2014 and MW-5I and MW-8I in 2017 tested positive for BTEX and MTBE. In February 2018, two 8-hour soil vapor extraction and air sparging tests were conducted at the site using mobile, trailer-mounted systems. Results indicated successful remediation and were used to design a system for full-scale remediation. http://prodenv.dep.state.fl.us/DepStaging/api/dms/11.3630303.1

HIDDEN VALLEY LAKE COMMUNITY SERVICES DISTRICT PILOTS INNOVATIVE CR(VI) REMEDIATION SYSTEM
Dozortsev, V. | Groundwater Solutions: Innovating to Address Emerging Issues for Groundwater Resources Conference, 6-7 August, Arlington, VA, abstract only, 2019

The SafeGuard H_2O Intelligent Trace Metal Remediation system was pilot tested at the Hidden Valley Lake Community Services District (HVLCSD) to study the technology's efficacy to continuously reduce Cr(VI) to below 10 parts per billion. The pilot site had a Cr(VI) level of 18-22 ppb with a well output of 1,100 gallons per minute. The technology features an online Cr(VI) analyzer to control and monitor system performance in real-time making the system suitable for HVLCSD's remote location. The pilot system was designed to minimize treated waste streams while demonstrating performance at scale, limiting the size and cost of the pilot unit, aiding the rapid deployment of the technology and minimizing disruption to the pilot site owing to its very small footprint. *See presentation by K. Cloyd and R. Sistek for more information:* http://www.aquametrologysystems.com/wp-content/uploads/2019/08/TriState_2019_AMS_Hidden_Valley_Cr_PPT_FINAL.pdf *Realtime Cr(VI)monitoring data, San Francisco Bay area:* http://www.aquametrologysystems.com/learn-more-cr/ *Pilot test results:* https://www.hvlcsd.org/hexavalent-chromium-test-results *See YouTube video on how the technology works:* https://www.youtube.com/watch?v=ELB6ZBQpGiI.

RESEARCH AND APPLICATION OF ARSENIC-CONTAMINATED GROUNDWATER REMEDIATION BY MANGANESE ORE PERMEABLE REACTIVE BARRIER
Li, Y., Y. Huang, W. Wu, M. Yan, and Y. Xie.
Environmental Technology [Published online 11 November 2019 prior to print]

Natural manganese ore, manganese ore granulation, loaded manganese ore, and mixed manganese ore were used as fillers in a simulated permeable reactive barrier (PRB) to test their feasibility for remediating arsenic-contaminated groundwater. The experiment determined that the four materials were capable of achieving removal rates >90%. The Dengjiatang area of Chenzhou City, Hunan Province was then selected for construction of a PRB pilot project. Studies showed that the arsenic content of the effluent at each monitoring point was below 10 µg/L indicating all four fillers were removing arsenic and can be used in full-scale remediation. In addition, ferric chloride and cement were used to stabilize the arsenic-containing waste residue. Leaching test results indicated that the arsenic concentration after curing was only 1 µg/L.

DESIGN, INSTALLATION, STARTUP AND OPERATION OF A MOBILE PFAS REMOVAL SYSTEM FOR INVESTIGATION-DERIVED WASTE
Wynkoop, D. | Real Property Institute of Canada Federal Contaminated Sites Regional Workshop, 405 June, Halifax, NS, 19 slides, 2019

A turnkey, modular, ion exchange resin system was designed to treat PFAS, petroleum, oil, lubricants chlorinated solvents, and dissolved metal-contaminated, investigation-derived waste at the Eielson Air Force Base in Fairbanks, Alaska. The system was designed to process 10,000-gallon batches and included sorbent media for free product removal, back-washable granular activated carbon filtration, ion exchange to remove iron and other fouling agents, and two types of specialized ion exchange resins for PFAS removal. The system was installed in an international shipping container for ease of transport and started treating water in October 2017. The presentation describes the design, installation, start-up, operation, and lessons learned, and reviews the first several months of operating data. https://www.epicglc.ca/images/2019_FCSRW/presentations/Design_Installation_Start-up_and_Operation_of_a_Mobile_PFAS_Removal_System_for_Investigation-Derived_Waste.pdf *More information* https://www.calgoncarbon.com/app/uploads/case_study_eielson_proof.pdf.

EXPEDITING GROUNDWATER REMEDIATION THROUGH ENHANCED ATTENUATION AT THE MOUND, OHIO, SITE
Zimmerman, B. | 2018 Long-Term Stewardship Conference, 20-24 August, Grand Junction, CO, 17 slides, 2018

In June 1995, EPA approved the Record of Decision for the Operable Unit 1 (OU 1) area of the Mound Site in Ohio that encompassed a historical waste disposal landfill. The original remedy for controlling contamination in OU 1 was the collection, treatment, and disposal of groundwater through a pump and treatment (P&T) system. Results from investigative field studies indicated that the cleanup timeframe for the P&T remedy was projected to require an additional 26 years, whereas enhanced attenuation (EA) had a projected cleanup timeframe of 13 years. EPA approved an EA field demonstration and the P&T system was placed on standby. In 2014, DOE initiated a multi-year field demonstration to evaluate whether EA could expedite the remediation of PCE, TCE, and daughter products detected in the groundwater. The field demonstration was initially scheduled to operate for three years but impacts from an off-site dewatering operation and regional drought conditions during the second year caused perturbation in data trends. As a result, the field demonstration was extended to include a fourth year. Nearing completion of its final year, the field demonstration indicates the OU 1 groundwater system has recovered from the effects of the lowered groundwater levels and increased hydraulic gradients experienced during the second year. Results from the third year of the field demonstration indicate the dissolved PCE and TCE plumes continue to decrease in size and mass. https://www.energy.gov/sites/prod/files/2018/10/f56/Zimmerman-Expediting-Groundwater-Remediation.pdf *See the EA Sampling and Analysis Plan* https://www.lm.doe.gov/cercla/documents/mound_docs/AR/2104XXXXXX-1410240003.pdf Also see https://www.energy.gov/em/articles/innovative-approach-cuts-cleanup-time-half-potentially-saving-6-million

Research

EFFECT OF THE SURFACE CHARGE ON THE ADSORPTION CAPACITY OF CHROMIUM(VI) OF IRON OXIDE MAGNETIC NANOPARTICLES PREPARED BY MICROWAVE-ASSISTED SYNTHESIS
Gallo-Cordova, A., M. del Puerto Morales, and E. Mazario | Water 11(11):2372

Superparamagnetic iron oxide nanoparticles (MNP) with different surface charges were tested as nanosorbents to remove Cr(VI) from aqueous solution. A microwave polyol-mediated method was used to synthesize uniform magnetic nanoparticles (~12 nm). Tetraethyl orthosilicate (TEOS) and (3-aminopropyl) triethoxysilane (APTES) were grafted onto the nanoparticle's surface to provide a variation in the surface charge. The adsorptive process of Cr(VI) was evaluated as a function of the pH, the initial concentration of Cr(VI), and contact time. Kinetic studies were best described by a pseudo-second-order model in all cases. TEOS+MNPs barely removed Cr(VI) from the media. Non-grafted particles and APTES+TEOS+MNP followed the Langmuir model with maximum adsorption capacities of 15 and 35 mgCr/g, respectively. Cr(VI) adsorption capacities abruptly increased when the surface became positively charged as the species coexisting at the experimental pH were negatively charged. These particles were found to be highly efficient in water remediation due to their 100% reusability after more than six consecutive adsorption/desorption cycles. *This article is* ***Open Access*** *at* https://www.mdpi.com/2073-4441/11/11/2372

THE COMBINED EFFECTS OF SURFACTANT SOLUBILIZATION AND CHEMICAL OXIDATION ON THE REMOVAL OF POLYCYCLIC AROMATIC HYDROCARBON FROM SOIL
LI, Y., X. Liao, S.G. Huling, T. Xue, Q. Liu, H. Cao, and Q. Lin.
Science of the Total Environment 647:1106-1112(2019)

A study was conducted to determine whether a combination of surfactant-aided soil washing and chemical oxidation by activated persulfate (SP) was effectively remediating PAH-contaminated soil. Triton X-100 (TX-100) and SP were applied to contaminated soil concurrently and sequentially. Results indicated that surfactant followed by amendment with a solution of TX-100+SP was most effective in decreasing PAH concentrations in sandy loam (from 1220 mg/kg to 414 mg/kg) and silty clay (2730 mg/kg to 180 mg/kg) soils. Compared with TX-100 alone and SP alone, TX-100+SP increased the removal of PAHs by 10-20% and exhibited greater reduction of oxygenated PAHs, including furans and xanthene. TX-100 improved the degradation of 3-4 ring PAHs and 5-6 ring PAHs in sandy loam soil by ~8%-11%.

USE OF A NON-THERMAL PLASMA TECHNIQUE TO INCREASE THE NUMBER OF CHLORINE ACTIVE SITES ON BIOCHAR FOR IMPROVED MERCURY REMOVAL
Wang, T., J. Liu, Y. Zhang, H. Zhang, W.-Y. Chen, P. Norris, and W.-P. Pan.
Chemical Engineering Journal 331:536-544(2018)

Biochar was prepared from rice straw (R6), tobacco straw (T6), corn straw (C6), wheat straw (W6), millet straw (M6), and black bean straw (B6) in high purity nitrogen at 600 ° C. The biochars were modified with chlorine non-thermal plasma to increase Cl active sites to promote mercury removal efficiency. Modification by chlorine plasma increased the Hg^0 removal efficiency of the biochars from ~8.0% to 80.0%. The Hg^0 adsorption capacity of T6 was 36 times higher after chlorine plasma modification. Plasma caused the biochar surface to become porous and promoted thermal stability. Sulfur content remained in the range of 0.5-0.7%, and elemental sulfur, organic sulfur, and sulfides were converted to sulfate. The relative intensity of the oxygen functional groups (C-O, C=O, and C(O)-O-C) was enhanced, while the oxygen content in biochar decreased. The improved mercury removal efficiency was attributed to the increased number of C-Cl groups on the surface of the biochars which functioned as activated sites and promoted the Hg^0 removal efficiency. https://par.nsf.gov/servlets/purl/10057034

REMOVAL KINETICS OF PETROLEUM HYDROCARBONS FROM LOW-PERMEABLE SOIL BY SAND MIXING AND THERMAL ENHANCEMENT OF SOIL VAPOR EXTRACTION
Yu, Y., L. Liu, C. Yang, W. Kang, Z. Yan, Y. Zhu, J. Wang, and H. Zhang.
Chemosphere 236:124319(2019)

Thermally-enhanced remediation of n-alkanes-contaminated silty soil mixed with coarse quartz sands was demonstrated in a 40 cm x 30 cm lab cylindrical tank. The experiment investigated the removal kinetics of semi-volatile n-alkanes (C10, C11, and C13-16) under three pulsed heating operations of SVE. CMG-STARS software was adopted to simulate the dynamics of heat transfer within the soil column. Results indicated a dramatic increase of air permeability of soil and acceleration of heat transfer after the introduction of sand and SVE achieved rapid soil remediation. Gas-phase transfer of n-alkanes mainly occurred when the average soil temperature was ≥100°C. After a 30.8 h run, the average soil concentration of total n-alkanes was reduced by 93.4%, from 3106.5 to 202.4 mg/kg. The residual n-alkanes of C10, C11, C13 and C14 in all collected soil samples were

PHOSPHATE INDUCED ARSENIC MOBILIZATION AS A POTENTIALLY EFFECTIVE IN-SITU REMEDIATION TECHNIQUE-PRELIMINARY COLUMN TESTS
Maier, M.V., Y. Wolter, D. Zentler, C. Scholz, C.N. Stirn, and M. Isenbeck-Schroter.
Water 11(11):2364(2019)

To accelerate ongoing but ineffective pump-and-treat efforts to remediate As in groundwater, the competitive effect of increasing phosphate doses contaminated aquifer material of different depths and under distinct geochemical conditions was examined. Columns with added phosphate showed significant amounts of As released rapidly under oxic and anoxic conditions, though levels were higher in anoxic columns. As(III) was the dominant species, in particular during the first release peaks and the anoxic tests. Higher amounts of phosphate did not trigger As release further and led to a shift of As species. The competitive surface complexation was the major process of As release especially when higher amounts of phosphate were used. While As release is commonly described at Fe-reducing conditions, observations suggested a change in redox potential towards Mn reducing conditions in the oxic tests. Fe reducing conditions in the anoxic column took place later and independently of As release. The reduction of As(V) to As(III) and a loss of sulfate in all columns with phosphate under both redox conditions was presumed to be an effect of microbial activity, which may play a significant role in the process of arsenic release. Preliminary tests with sediment material from a contaminated site showed that phosphate additions did not change the pH value significantly. Results indicated that in-situ application of phosphate amendments to As-contaminated sites could accelerate and enhance arsenic mobility to improve the efficiency of pump-and-treat remediation without negative side effects. *This article is* ***Open Access*** *at* https://www.mdpi.com/2073-4441/11/11/2364.

USE OF FUNCTIONALIZED BIMETALLIC MEMBRANES FOR TREATMENT OF CONTAMINATED GROUNDWATER AT A HAZARDOUS WASTE SITE IN KENTUCKY
Pacholik, L.C., Master's Thesis, University of Kentucky, 154 pp, 2019

Research was conducted on a portable membrane system that incorporates a functionalized bimetallic membrane technology to treat groundwater contaminated with VOCs and sVOCs at a former organic chemical manufacturing plant in Louisville, KY. Three bench-scale tests were performed with a membrane treatment system using deionized water spiked with the chemical TCE. Results showed that using functionalized Fe/Pd membranes significantly decreased TCE concentrations over time. While further tests should be conducted to verify the results of the preliminary bench-scale tests, the membrane treatment system shows potential for use at the hazardous waste site in Kentucky.
https://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1084&context=ce_etds

ADSORPTION OF PERCHLORATE FROM WATER USING QUATERNARY AMMONIUM-FUNCTIONALIZED CHITOSAN BEADS
Sowmya, A., D. Das, S. Prabhakar, M.M. Kumar, K. Anbalagan, and M. Rajesh
Environmental Process & Sustainable Energy [Published online 23 July 2019 prior to print]

In this study, perchlorate was efficiently removed from water using quaternary ammonium-functionalized cross-linked chitosan beads (QACB). This synthesized bead was found to be efficient in terms of perchlorate removal capacity, 100% regeneration of used beads (using HCl or NaCl), and selectivity in the presence of coanions, namely, chloride, sulfate, carbonate, and nitrate. QACB removes perchlorate by the exchange of chloride ions. QACB was able to remove >95% perchlorate from brackish water. Batch studies were conducted to optimize the condition for maximum perchlorate removal. The perchlorate removal capacity of QACB from 1,000 mg/L aqueous solutions was 153 mg/g. The outcome of pH variation studies indicated that QACBs can remove perchlorate in pH ranges of 2-11. Equilibrium isotherm data of adsorption of perchlorate at temperature 303, 313, and 323 K were well fitted to the linear Freundlich, Langmuir, and Dubinin-Radushkevich isotherm models. The adsorption kinetics data were best described by the pseudo-second-order kinetic model. FTIR was used to confirm the interaction of perchlorate with QACB.

General News

ADVANCES IN REMEDIATING GROUNDWATER CONTAMINATED WITH CHLORINATED SOLVENTS
Richardson, S., and C. Divine., SERDP & ESTCP Webinar Series, Webinar #105, December 2019

SERDP & ESTCP sponsored two webinars in this series that discussed new technological advances in the field of groundwater remediation. The first discussed an ongoing ESTCP project aimed to demonstrate an innovative application of the Grout Bomber technology to improve the delivery of remedial amendments at matrix-diffusion sites. The presentation included operational and performance results for this diffusion-based technology at Site 17, Naval Support Facility Indian Head, Maryland. The second presentation featured a discussion of the Horizontal Reactive Media Treatment Well (HRX Well®), which included results of modeling, tank tests and field implementation at Vandenberg Air Force Base, California.
https://www.serdp-estcp.org/Tools-and-Training/Webinar-Series/12-12-2019

PERFLUOROALKYL SUBSTANCES IN THE ENVIRONMENT: THEORY, PRACTICE, AND INNOVATION
Kempisty, D.M., Y. Xing, and L. Racz (eds.). CRC Press, Boca Raton, FL. ISBN 9781498764186, 498 pp, 2018

Organized into four sections, this book discusses the various challenges of PFAS in the environment today, including their historical use, their chemical and toxicological properties. It also discusses analytical challenges and special considerations in sampling. Practical recommendations are provided for dealing with these compounds in today's dynamic regulatory landscape, and various conventional and state-of-the-art remediation techniques are discussed. The book explores the challenges across the topical areas of regulation and management, toxicology, environmental remediation, and analytical sampling and analysis. *View the table of contents and abstracts at* https://www.crcpress.com/Perfluoroalkyl-Substances-in-the-Environment-Theory-Practice-and-Innovation/Kempisty-Xing-Racz/p/book/9781498764186

PFAS EXPERTS SYMPOSIUM: STATEMENTS ON REGULATORY POLICY, CHEMISTRY AND ANALYTICS, TOXICOLOGY, TRANSPORT/FATE, AND REMEDIATION FOR PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) CONTAMINATION ISSUES
Simon, J.A., S. Abrams, T. Bradburne, D. Bryant, M. Burns, D. Cassidy, J. Cherry, et al.
Remediation 29(4):31-48(2019)

Sixty members of the scientific, engineering, regulatory, and legal communities assembled for the PFAS Experts Symposium on May 20-21, 2019 to discuss issues related to PFAS based on the quickly evolving developments of regulations, chemistry and analytics, transport and fate concepts, toxicology, and remediation technologies. The symposium created a venue for experts with various specialized skills to provide opinions and trade perspectives on existing and new approaches to PFAS assessment and remediation in light of lessons learned managing other contaminants encountered over the past four decades. Concerns included time, expense, and complexity required to remediate PFAS sites and whether the challenges of PFAS warrant alternative approaches to site cleanups, including the notion that adaptive management and technical impracticability waivers may be warranted at sites with expansive PFAS plumes. A paradigm shift towards receptor protection rather than broadscale groundwater/aquifer remediation may be appropriate. https://onlinelibrary.wiley.com/doi/epdf/10.1002/rem.21624

NEW PERSPECTIVES ON HORIZONTAL TO VERTICAL WELL RATIOS FOR SITE CLEANUP
Laton, W.R. | Remediation 30(1):27-31(2019)

Directional drilling has been used for a variety of purposes, including utilities, dewatering, and remedial activities. Using this method for site cleanup versus traditional vertical extraction wells needs to be considered based upon today's remedial challenges. Traditionally, it has been stated that a single horizontal well can substitute for up to 11 vertical wells. This "rule" is arbitrary since the length and depth of the plume, surface access, and hydrogeological conditions must be considered. A better way to evaluate the cost-benefit of a horizontal versus vertical well system is a predicted zone of influence using a mathematical and hydrogeological approach, as described herein.
https://onlinelibrary.wiley.com/doi/epdf/10.1002/rem.21628

CRITICAL REVIEW OF THE SCIENCE AND SUSTAINABILITY OF PERSULPHATE ADVANCED OXIDATION PROCESSES
Ike, I.A., K.G. Linden, J.D. Orbell, and M. Duke.
Chemical Engineering Journal 338:651-669(2018)

This review provides a critical evaluation of various published techniques for the activation of PS, suggests novel explanations for important observations in the field, and advances proposals to explain reaction mechanisms more consistently. Discrepancies in results and areas for further studies were identified with the view of enhancing the sustainability and reliability of PS-AOPs.

A REVIEW IN THE CURRENT DEVELOPMENTS OF GENUS DEHALOCOCCOIDES, ITS CONSORTIA AND KINETICS FOR BIOREMEDIATION OPTIONS OF CONTAMINATED GROUNDWATER
Saiyari, D.M., H.-P. Chuang, D.B. Senoro, T.-F. Lin, L.-M. Whang, Y.-T. Chiu, and Y.-H. Chen.
Sustainable Environment Research 28:149-157(2018)

Current developments in using *Dehalococcoides* as key dechlorinating bacteria in chlorinated ethene contaminated sites are the topic of this publication. The review elucidates the kinetics of *Dehalococcoides* growth and compound utilization in the dechlorination of chlorinated ethenes compounds.
https://reader.elsevier.com/reader/sd/pii/S2468203917301668?token=CBB387351A02B9F29B44590083D702C8923E6D82CA8589B024FBE0295E4556CBAE213D4EC190855FB77D9DF21FF698F2

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