Technology Innovation News Survey

Entries for September 1-15, 2020

Market/Commercialization Information

WASTE MANAGEMENT SUPPORT - CHEMICAL WARFARE MATERIAL

Dept of the Army, W4MM USA Joint Munitions Command, Rock Island, IL.
Contract Opportunities at Beta.SAM, Solicitation W52P1J20R0114, 2020

This is a sources sought synopsis to request statements of interest and capability from industry. No RPF is available at this time. The Army's Recovered Chemical Material Directorate has developed mobile treatment technologies capable of deployment to various geographical locations for disposing of chemical warfare material (CWM) items. These deployments generate waste that must be managed in accordance with local, state, federal, and sometimes international treaty requirements. The contractor is responsible for day-to-day management of both permitted and non-permitted hazardous waste storage areas; purchasing the appropriate waste containers to match the anticipated waste streams; conducting RCRA sampling; contracting with a certified laboratory for chemical analysis; generating waste profiles and waste manifests; coordinating shipments of the waste to a permitted treatment, storage and disposal facility (TSDF); and providing documentation from the TSDF for waste received and final destruction. Contractor should have extensive experience managing CWM waste with an exemplary environmental compliance record, the ability to work with all members of the regulatory community, and a strong relationship with TSDFs throughout the United States. Interested parties are invited to describe their capability to respond to the above requirements by 1:00 PM PT on October 30, 2020. The NAICS code is 562998. Subject contract action is anticipated by February 28, 2022. [Note: The anticipated contract vehicle follows current contract W52P1J17D0029.]
https://beta.sam.gov/opp/d855ccaf7028476cb05b6491fd82954e/view

SOLICITATION W9128F20R0046 - $49M ERS WEST SATOC - SB SET-ASIDE

U.S. Army Corps of Engineers (USACE), Northwestern Div., Omaha District, Omaha, NE.
Contract Opportunities at Beta.SAM, Solicitation W9128F20R0046, 2020

This RFP is a small business set-aside under NAICS code 562910 (Environmental Remediation Services). The resulting contract will be an IDIQ single-award task-order contract (SATOC) in support of the USACE Northwestern Division, Omaha District and its existing customers. The estimated maximum value for all orders issued against this SATOC is $49M. Offers are due by 2:00 PM CT by November 2, 2020.
https://beta.sam.gov/opp/84f75d7857d446cb8da53bc04c84d17c/view

FY21 SB 8(A) SET-ASIDE IDIQ A-E FOR HAZARDOUS, TOXIC, AND RADIOLOGICAL WASTE SERVICES IN SUPPORT OF THE USACE SEATTLE DISTRICT

U.S. Army Corps of Engineers (USACE), Seattle District, Seattle, WA.
Contract Opportunities at Beta.SAM, Solicitation PANNWD-20-P-003428, 2020

This notice is a request for submittal of SF330 information packages under NAICS code 541330 (Engineering Services). The government intends to award a single small business 8(a) set-aside IDIQ A-E contract for hazardous, toxic, and radiological waste (HTRW) services within primarily the USACE Seattle District, which encompasses Washington, Oregon, Idaho, and Montana. The number of contracts awarded might be adjusted based upon the selection criteria. The IDIQ A-E contract will have a 3-year base period of performance, with no option periods. Total capacity is $5M cumulative for the life of the contract. Task orders awarded under this IDIQ contract will be firm fixed price. Task order scopes may involve preparation of RFPs and A-E support during execution of one or more project phases of remedial action, ranging from planning and assessment through investigation; analysis (feasibility); design of cleanup or control systems; monitoring, restoration or redevelopment of contaminated sites; and other services as required by the Government. SF330 packages are due via SAFE electronic transmission - https://safe.apps.mil/ - by 1:00 PM PT on November 2, 2020. https://beta.sam.gov/opp/a59e9c3086574ebb88ac823159bfa40b/view

PRE-AWARD ERTP SMALL - HEALTH & SAFETY

Environmental Protection Agency, Headquarters Acquisition, Washington, DC.
Contract Opportunities at Beta.SAM, Solicitation 68HERH20Q0051, 2020

This total small business set-aside is open to all small business socioeconomic classifications under NAICS code 541620. A blanket purchase agreement (BPA) is being established to provide support for the Environmental Response Training Program. This single-award BPA will be established against a multiple award schedule. Quotes will be solicited and received from at least three sources. The Environmental Response Team is required under 40 CFR 300.145(b)(3) to provide both introductory and intermediate level training courses to prepare response personnel from federal, state, and local government agencies in techniques and methods for preventing and mitigating chemical releases while protecting the health and safety of response personnel and the public. The anticipated duration of the BPA is estimated to be February 19, 2021, through February 18, 2026, for a maximum total of five years consisting of a one-year base period and four one-year options. The Government anticipates establishing the BPA by December 15, 2020, with an effective date of February 19, 2021. Monitor FedConnect for updates at https://www.fedconnect.net/FedConnect/?doc=68HERH20Q0051&agency=EPA. Offers are due via FedConnect by 5:00 PM ET on November 2, 2020. https://beta.sam.gov/opp/0ca461e452f74b11b8ec00c1a2072897/view

ENVIRONMENTAL SCIENCE AND ENGINEERING SERVICES FOR NAVAL FACILITIES ENGINEERING AND EXPEDITIONARY WARFARE CENTER WORLDWIDE

NAVFAC Engineering Expeditionary Warfare Center (EXWC), Port Hueneme CA.
Contract Opportunities at Beta.SAM, Solicitation N39430-21-R-2201, 2020

This acquisition is issued for full and open competition under NAICS code 541330, annual size standard $16.5M. There is no RFP package to download. NAVFAC EXWC is soliciting SF-330s for a single-award IDIQ A-E contract for various environmental restoration and other environmental projects to support other NAVFAC commands as well as other DoD

and federal agencies. Although the majority of the work is expected to be in the continental United States, project sites could be worldwide. The maximum value of all task orders placed under this contract will not exceed $100M over a base ordering period of 60 months and an extension of services period not to exceed six months. A-E firms that meet the requirements described in the announcement are invited to submit a completed SF-330 package by 2:00 PM PT on November 12, 2020. Estimated award date is June 2021.
https://beta.sam.gov/opp/5fafac6a8c9b4bea9db0e025623e8b98/view

Cleanup News

COLLOIDAL ACTIVATED CARBON FOR IN SITU REMEDIATION OF PFAS: A REVIEW OF MULTIPLE CASE STUDIES

Thoreson, K., M. Dooley, and P. Erickson.
National Ground Water Association Groundwater Week, 3-5 December, Las Vegas, NV, abstract only, 2019

Multiple field sites have been treated with a single application of colloidal activated carbon to address PFAS contamination and comingled contaminants. In each case, amendments were applied under low-pressure conditions using direct-push technology. Monitoring at all sites is ongoing, with current data ranging from three months to over two years, and has included analysis of PFOS, PFOA, shorter chain PFASs, and co-contaminant concentrations. The case studies indicate that the in situ application of colloidal activated carbon offers a new strategy to address the risk associated with PFAS contamination at a low cost.

MANAGING COMPLEX SITES WITH HIGH RESOLUTION SITE CHARACTERIZATION AND FOCUSED REMEDIATION

Sankey, J.
Groundwater Resources Association Remediation Conference: Optimization of Remediation Systems and Long-Term Monitoring, 13-14 November, Santa Ana, CA, 35 slides, 2019

Recent groundwater characterization and instrumentation approaches are used at three sites to show that they can provide a sound and defensible conceptual site model to help design a range of different remedies to reach the overall goal at a complex site. At the Boone Dry Cleaner, Fort Ord, and Well 12A on the South Tacoma Channel Superfund site, the technologies, including GeoTrax Survey™ scans, CSM+™, cased wells, multi-port systems, and sampler probes, were used to perform high-resolution site characterization or focused remediation before and during remedial activities. https://www.grac.org/media/files/files/0cd1a0e1/sankey.pdf
More information on the electrical resistivity imaging at Boone Dry Cleaner:
https://aestusllc.com/wp-content/uploads/2014/05/2011_Halihan-et-al_ERI-injectates-dry-cleaners.pdf
Ford Ord site documents: https://www.fortordcleanup.com/documents/search/
*See **pages 11-38** of the Fifth Five-Year Review Report for Commencement Bay, South Tacoma Channel Superfund Site:* https://semspub.epa.gov/work/10/100120454.pdf

OPTIMIZATION OF HYDRAULIC CAPTURE OF CVOCS AND MANAGEMENT OF INJECTION WELL FOULING FOR A GROUNDWATER TREATMENT AND INJECTION SYSTEM

Canfield, C.
Groundwater Resources Association Remediation Conference: Optimization of Remediation Systems and Long-Term Monitoring, 13-14 November, Santa Ana, CA, 24 slides, 2019

A groundwater remediation system comprising a dual-screen extraction well and five upgradient injection wells to treat CVOCs in a leaky confined aquifer was reviewed for opportunities to optimize the system and avoid the proposed disposal of treated water to the sanitary sewer. Techniques used included stratigraphic sequence modeling, video logs, flow surveys, and depth-discrete sampling of the extraction well. Results led to improvements that reduced the extraction rate from 60 to 40 gal/min, focused the plume capture to areas with greater contaminant mass, educed vertical downward gradient to the lower aquifer, and reduced the frequency of well rehabilitation efforts. Next steps include the evaluation of transport pathways of injected water in the A-Sand for further remedial optimization.
https://www.grac.org/media/files/files/f9465195/canfield.pdf

REMOVAL OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFASS) IN A FULL-SCALE DRINKING WATER TREATMENT PLANT: LONG-TERM PERFORMANCE OF GRANULAR ACTIVATED CARBON (GAC) AND INFLUENCE OF FLOW-RATE

Belkouteb, N., V. Franke, P. McCleaf, S. Kohler, and L. Ahrens.
Water Research 182:115913(2020)

The treatment efficiency of a full-scale drinking water treatment plant for removal of 15 PFAS was tracked from 2015-2017 in Uppsala, Sweden. Removal of five PFASs was influenced by GAC filter total operation time, GAC type, and surface loading rate. The average PFAS removal efficiency ranged from 92-100% for "young" GAC filters and 7.0-100% for "old" GAC filters (≤357 operation days, 29,300 bed volumes (BV) treated). Flow rates were adjusted in two full-scale GAC filters to examine the removal of PFAS and organic matter, depending on GAC operational age and operating flow. The decrease in flow-rate from 39 to 29 L/s led to an average increase of 14% and 6.5% in total PFAS removal efficiency for an "old" (264 operation days, 21,971 BV treated) and a "young" GAC filter (63 operation days, 5,725 BV treated), respectively. A cost analysis for various operation scenarios illustrated the dominating effect of treatment goals and GAC regeneration costs on overall GAC operation costs. The unit costs for GAC filters ranged from 0.08-0.10 €/m^3 of water treated for a PFAS treatment goal of 10 ng/L and 0.020-0.025 €/m^3 of water treated for a treatment goal of 85 ng/L. Prolonging the GAC service life by lowering the flow rates after reaching the treatment goal could lead to a 26% cost reduction.

Demonstrations / Feasibility Studies

BIOREMEDIATION OF 1,4-DIOXANE: SUCCESSFUL DEMONSTRATION OF IN SITU AND EX SITU APPROACHES

Horst, J.F., C.H. Bell, A. Lorenz, M. Heintz, Y. Miao, J. Saling, D. Favero, and S. Mahendra.
Groundwater Monitoring & Remediation 39(4):15-24(2019)

At a Lansing, Michigan site, pilot-scale testing of in situ and ex situ biodegradation approaches was explored to treat 1,4-dioxane in groundwater. Results were used to support the selection and refinement of the in situ approach for full-scale deployment. *Read the first page for free at* https://ngwa.onlinelibrary.wiley.com/doi/10.1111/gwmr.12354.

PHYTOREMEDIATION OF SLIGHTLY BRACKISH, POLYCYCLIC AROMATIC HYDROCARBON-CONTAMINATED GROUNDWATER FROM 250 FT BELOW LAND SURFACE: A PILOT-SCALE STUDY USING SALT-TOLERANT, ENDOPHYTE-ENHANCED HYBRID POPLAR TREES AT A SUPERFUND SITE IN THE CENTRAL VALLEY OF CALIFORNIA, APRIL-NOVEMBER 2019

Landmeyer, J.E., S. Rock, J.L. Freeman, G. Nagle, M. Samolis, H. Levine, A.-M. Cook, et al.
Remediation [Published online 22 September prior to print]

Slightly brackish groundwater contaminated with PAHs was pumped into 18,330-gallon intermediate containers called totes containing poplar trees enhanced to remediate PAHs over seven months. Various totes contained hybrid poplars with and without and the endophyte *Pseudomonas putida* PD1, planting medium only, and only groundwater. Total naphthalene removal ranged from 88%-100% across all totes. The lowest, observed in a tote that contained only planting medium, indicated substantial adsorption of naphthalene onto the planting medium's high organic content. In vivo passive samplers in the tree trunks confirmed the uptake of naphthalene and other PAHs and BTEX by the hybrid poplars. Results indicate that a full-scale application of salt-tolerant hybrid poplar trees could effectively decrease naphthalene concentrations in groundwater pumped from the deep aquifer.

THE MIN-TRAP™ SAMPLER A NEW MONITORING WELL-BASED SAMPLING TOOL FOR DOCUMENTING IN SITU MINERAL FORMATION

Divine, C., S. Ulrich, J.M. Tilton, D. Liles, S. Justicia-Leon, E. Carter, K. Clark, and D. Taggart.
Groundwater Resources Association Remediation Conference: Optimization of Remediation Systems and Long-Term Monitoring, 13-14 November, Santa Ana, CA, 17 slides, 2019

The Mineral Trap (Min-Trap) is a passive sampling device that consists of a solid medium within a permeable mesh that is deployed and incubate inside a monitoring well. The medium provides a carrier substrate upon which target minerals can form passively. The presentation explains how the Min-Trap works, and results are presented for various laboratory and field tests. Takeaways include that Min-Traps can fill major data gaps for metals and CVOC treatment performance evaluation and that they are appliable where active precipitation, dissolution, or transformation of minerals occurs. https://www.grac.org/media/files/files/51a442ef/divine.pdf
See a video explaining the device on the project's SERDP page:
https://serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Monitoring/ER19-5190

FINAL YEAR 1 SEMIANNUAL REPORT FOR THE SITE INVESTIGATION FOR MONITORED NATURAL ATTENUATION PILOT STUDY SITE 45 FORMER BUILDING 200 WASH RACK DISPOSAL PIT VOLUME 1 OF 3 NAS JACKSONVILLE FL

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

The 2016 Focused Feasibility Study for Potential Source of Contamination (PSC) 45 selected monitored natural attenuation (MNA) and land use controls to prevent unacceptable human exposure to contaminated groundwater. Before implementing the remedy, a pilot test was implemented to determine if MNA was effective and viable. From February to March and June 2019, two PSC 45 monitoring wells and two monitoring wells located downgradient of PSC 45 were sampled for metals, total recoverable petroleum hydrocarbons, PAHs, VOCs, and MNA parameters. An evaluation of groundwater analytical results and field parameters revealed that reducing conditions are present in some portions of the aquifer, which may support reductive pathways.
https://www.navfac.navy.mil/niris/SOUTHEAST/JACKSONVILLE_NAS/N00207_004797.PDF
Volume 2: Target Compound Quantitation Reports
https://www.navfac.navy.mil/niris/SOUTHEAST/JACKSONVILLE_NAS/N00207_004798.pdf
Volume 3: Sampling Reports https://www.navfac.navy.mil/niris/SOUTHEAST/JACKSONVILLE_NAS/N00207_004799.pdf

FLOATING TREATMENT WETLANDS AND PLANT BIOREMEDIATION: NUTRIENT TREATMENT IN EUTROPHIC FRESHWATER LAKES

Grosshans, R., K. Lewtas, G. Gunn, and M. Stanley. International Institute for Sustainable Development, Winnipeg, Manitoba Canada, 37 pp, 2019

Floating treatment wetlands (FTWs) were deployed as an innovative bioremediation option at Pelican Lake, Manitoba, to take up and remove nutrients from the sediment and water. Floating wetland platforms were first deployed in Lake 227 and Lake 114 (control) to quantify the impact of phosphorus enrichment in lake ecosystems on plant productivity and to assess nutrient sequestration of cattail plants growing on floating platforms. The systems were then applied to Pelican Lake to determine how FTWs would work as a bioremediation option for eutrophic water bodies. FTW coverage of 5% of the Pelican Lake surface could reduce total phosphorus levels in the lake by up to 50%, depending on total phosphorous removal levels by the FTW system. Given the size of Pelican Lake, other options would be needed to decrease concentrations below the 0.25 mg/L guideline.
https://www.iisd.org/system/files/publications/floating-treatment-wetlands.pdf

Research

A SUSTAINABILITY ASSESSMENT OF AN IN SITU ULTRASONIC REACTOR FOR REMEDIATION OF PFAS-CONTAMINATED GROUNDWATER

Laramay, F., and M. Crimi. | Remediation [Published online 09 October 2020 prior to print]

The sustainability and cost impacts of an ultrasonic reactor installed in an in situ reactor technology [InSRT] horizontal well system at a hypothetical site were quantified and compared to those of hypothetical pump-and-treat (PT) systems. Results showed that the InSRT system had lower lifecycle impacts and costs than the PT system when each was considered under individually optimal conditions. InSRT was found to meet sustainability goals when used in a low-hydraulic conductivity source zone, and the PT system lifecycle impacts were reduced when the system was used in a high-hydraulic conductivity area.

HIGH DEGRADATION OF TRICHLOROETHYLENE IN WATER BY NANOSTRUCTURED MENPS@CALB BIOHYBRID CATALYSTS

Losada-Garcia, N., A. Rodriguez-Otero, and J.M. Palomo. | Catalysts 10:753(2020)

A methodology was developed to rapidly degrade TCE and 1,1-DCE in distilled water and room temperature using bionanohybrids of Pd, Fe, Cu, and Zn. These bioanaohybrids were obtained by enzyme-metal coordination called MeNPs@CALB. The bionanohybrids containing Cu_2O nanoparticles (Cu2O@CALB) removed 95% of TCE in 10 minutes using 1.5 g/L of catalyst and 94% of 1,1-DCE in 1 minute. The bionanohybrids exhibited excellent stability and recyclability under sustainable conditions, maintaining their effectiveness in more than 90% for three cycles.
https://www.mdpi.com/2073-4344/10/7/753/pdf

OPTIMIZATION OF AERATION ENHANCED SURFACTANT SOIL WASHING FOR REMEDIATION OF DIESEL-CONTAMINATED SOILS USING RESPONSE SURFACE METHODOLOGY

Ayele, B.A., J. Lu, and Q. Chen. | PeerJ 8:e8578(2020)

Conventional soil washing performance efficiency was enhanced 12-25% by incorporating air bubbles into a low-concentration surfactant soil-washing system. Surfactant selection pre-experiment using aerated and conventional soil washing revealed Brij 35>TX100>Tween 80>Saponin in diesel oil removal. The optimum degree of variables achieved was 90 min of washing time, 370 mg/L of concentration, washing pH of 10, 535 rpm of agitation speed, and 7.2 L/min of airflow rate with 79.5% diesel removal. The efficiency of aeration-assisted and conventional soil washing was variable depending on the type of surfactant, organic matter content of the soil, particle size distribution, and pollutant weathering level. The difference in the two methods' removal efficiency increased when organic matter increased and when the particle size and age of contamination decreased. https://peerj.com/articles/8578.pdf

REMOVAL AND RECOVERY OF METHYL TERTIARY BUTYL ETHER (MTBE) FROM WATER USING CARBON NANOTUBE AND GRAPHENE OXIDE IMMOBILIZED MEMBRANES

Intrchom, W., S. Roy, and S. Mitra. | Nanomaterials 10:578(2020)

Functionalized carbon nanotube-immobilized membranes (CNIM-f) and graphene oxide-immobilized membranes (GOIM) were developed for enhanced MTBE separation via sweep gas membrane distillation. CNIM-f provided the best performance in terms of flux, removal efficiency, mass transfer coefficients, and overall selectivity. Both types of modified membranes demonstrated high performance in MTBE removal from its aqueous mixture. The immobilization f-CNTs and graphene oxide altered the membrane's surface characteristics and enhanced partition coefficients, thus assisting MTBE transport across the membrane. The MTBE flux reached as high as 1.4 kg/m^2 h with functionalized carbon nanotubes, 22% higher than that of an unmodified polytetrafluoroethylene (PTFE) membrane. The maximum MTBE removal using CNIM-f reached 56% at 0.5 wt% of MTBE in water and a temperature of 30°C. With selectivity as high as 60, MTBE recovery from contaminated water is viable using these nanocarbon-immobilized membranes.
https://www.mdpi.com/2079-4991/10/3/578/pdf

ACCUMULATION OF SIX PFAS COMPOUNDS BY WOODY AND HERBACEOUS PLANTS: POTENTIAL FOR PHYTOEXTRACTION

Huff, D.K., L.A. Morris, L. Sutter, J. Costanza, and K.D. Pennell.
International Journal of Phytoremediation [Published online 10 July 2020 prior to print]

A greenhouse study evaluated the potential for eight herbaceous and seven woody plant species to absorb PFPeA, PFHxA, PFOA, PFBS, PFHxS, and PFOS. PFAS were added weekly to irrigation water, and plants were grown for up to 14 weeks after an initial establishment period. Significant accumulation of all PFAS compounds occurred in at least one plant species. Mass recovery in above-ground tissue by the best performing plant ranged from 3.8% for PFOS by *Festuca rubra* to 42% for PFPeA by *Schedonorus arundinaceus*. Hyperaccumulation was observed for all six PFAS compounds in at least one plant species.

CONCENTRATING PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) IN MUNICIPAL SOLID WASTE LANDFILL LEACHATE USING FOAM SEPARATION

Robey, N.M., B.F. da Silva, M.D. Annable, T.G. Townsend, and J.A. Bowden.
Environmental Science & Technology 54(19):12550-12559(2020)

The surfactant properties of PFAS were exploited to concentrate the compounds in foam produced via bubble aeration of landfill leachate. The technique's effectiveness to concentrate PFAS varied by compound, with a mean removal percentage of 69% and a median removal percentage of 92% among the 10 replicate foaming experiments. Results suggest that foaming to sequester PFAS as a pretreatment or preconcentration for landfill leachates may be a practical approach that could be coupled with high-energy PFAS-destructive treatment technologies.

TRACING THE SOURCES AND MICROBIAL DEGRADATION OF PCBS IN FIELD SEDIMENTS BY A MULTIPLE-LINE-OF-EVIDENCE APPROACH INCLUDING COMPOUND-SPECIFIC STABLE ISOTOPE ANALYSIS

Huang C., Y. Zeng, X. Luo, Z. Ren, Q. Lu, Y. Tian, S. Gao, S. Wang, S. Harrad, and B. Mai.
Water Research 182:115977(2020)

A multiple-line-of-evidence approach was used to investigate the fate of PCBs in three sediment cores from a pond near e-waste recycling plants. The goal was to evaluate contaminant sources and natural attenuation of PCBs. The difference in the maximum PCB concentrations and associated depths and the corresponding significant difference in $\delta^{13}C$ values strongly indicated two different PCB inputs in cores 1, 2, and 3. Results suggested that different degrees of PCB degradation occurred and that *Dehalococcoides* likely participated in PCB degradation. The progressive enrichment in ^{13}C with increasing core depth suggested strengthened microbial degradation of the residual congener pools.

SOURCES OF POLYCHLORINATED BIPHENYLS TO UPPER HUDSON RIVER SEDIMENT POST-DREDGING

Chitsaz, M., D.E. Fennell, and L.A. Rodenburg. | Chemosphere 259:127438(2020)

Dredging of portions of the Upper Hudson River (UHR) was conducted from 2009-2015 as a partial remedy for PCB contamination. In 2017, a comprehensive post-dredging survey of sediment recontamination was conducted by analyzing 130 samples for PCBs. Six source factors were observed, five of which were attributable to GE. Congener patterns of dechlorination factors suggested that chlorine removal at the ortho position occurred in the UHR sediment and could theoretically lead to complete dechlorination. One factor not attributable to GE represented PCB inputs from tributaries and urban areas and explained 1.7% of the PCB mass in the sediments. The small contribution from the

non-GE PCB source suggests that sediment recontamination after dredging was minor.

IN SITU CHEMICAL OXIDATION OF CONTAMINATED GROUNDWATER USING A SULFIDIZED NANOSCALE ZEROVALENT IRON-PERSULFATE SYSTEM: INSIGHTS FROM A BOX-TYPE STUDY

Rayaroth M.P. D. Oh, C.-S. Lee, Y.-G. Kang, Y.-S. Chang.
Chemosphere 257:127117(2020)

A sulfidized nanoscale zero-valent iron(S-nZVI)-persulfate (PS) system was used for situ chemical oxidation (ISCO) of groundwater pollutants. Synthetic water contaminated with reactive black-5 (RB-5) was continuously passed through a sand-filled rectangular box with an S-nZVI permeable reactive barrier. PS injection led to the complete removal of RB-5, and the system remained reactive for ~12 days. The oxidation products of S-nZVId further activated PS to retain its reactivity. In a separate trial, the method exploited oxidation, reduction, adsorption, and co-precipitation mechanisms that conspired to remove arsenite and 1,4-dioxane.

General News

NATURAL SOURCE ZONE DEPLETION (NSZD)

Rousseau, M. American Institute of Professional Geologists Virtual Forum, May 8, 2020

This presentation discusses the fundamentals of NSZD, provides an overview of the most commonly used methods to quantify it, and considers the different ways it may factor into managing petroleum-contaminated sites. Case studies are included from the U.S., Canada, and Australia illustrating different ways NSZD rates were quantified, how NSZD rates compared to conventional LNAPL recovery system performance, and how NSZD fit into the overall LNAPL site management strategies. https://www.youtube.com/watch?v=RUdxFGSqDYI&feature=youtu.be

PETROLEUM NAPL DEPLETION ESTIMATES AND SELECTION OF MARKER CONSTITUENTS FROM COMPOSITIONAL ANALYSIS

DeVaull, G.E., I.A.L. Rhodes, E. Hinojosa, and C.L. Bruce.
Groundwater Monitoring & Remediation [Published online 28 September 2020 prior to print]

Methods to select marker constituents and quantitatively and conservatively estimate NAPL depletion rates and trends over time are presented. Example estimates are included for two sites with different NAPL mixtures present, where depletion of half the initial total NAPL was estimated at 13.6±2.9 years and 7.3±1.8 years, respectively. Neither site was actively remediated. The method includes steps to identify the best set of analyzed candidate marker constituents in a NAPL mixture and can confirm prior-selected markers. However, it is particularly useful for NAPL mixtures in which no prior-identified marker constituents are present.

ZERO-VALENT IRON NANOPARTICLES FOR SOIL AND GROUNDWATER REMEDIATION

Galdames, A., L. Ruiz-Rubio, M. Orueta, M. Sanchez-Arzalluz, and J.L. Vilas-Vilela.
International Journal of Environmental Research and Public Health 7(16):5817(2020)

This review summarizes the main zero-valent iron nanoparticles and their remediation capacity and identifies pilot and land scale studies for each kind of nanomaterial.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7460444/pdf/ijerph-17-05817.pdf

THE FATE OF MTBE AND BTEX IN CONSTRUCTED WETLANDS

Stefanakis, A.I. | Applied Sciences 10:127(2020)

This article discusses using constructed wetlands to remediate hydrocarbon-polluted water and presents the latest wetland technology developments to remove MTBE and benzene, toluene, ethylbenzene, and xylenes (BTEX). The discussion includes the overall efficiency of the different wetland types that have been tested and used, the main transformation and removal processes that regulate BTEX and MTBE fate in constructed wetlands, and the potential for future investigations. https://www.mdpi.com/2076-3417/10/1/127/pdf

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

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

Site-specific treatability studies were conducted to validate the performance of in situ thermally-enhanced persulfate oxidation for PFAS at low pH. Because this technology is not expected to fully destroy all PFAS, the technology would need to be used in combination with pump-and-treat to address a mixed PFAS source zone.
https://www.serdp-estcp.org/content/download/51824/510001/file/ER-201729%20Final%20Report.pdf

CURRENT APPLICATION OF MICROENCAPSULATION TECHNOLOGY IN BIOREMEDIATION OF POLLUTED GROUNDWATER

Ethica, S.N., A. Firmansyah, S.I. Muchlissin, A.R. Sulistyaningtyas, A.R. Ernanto, et al.
World Journal of Agriculture and Soil Science, Vol. 4, Iss. 3(2020)

Benefits of microencapsulation technology for in situ bioremediation of polluted groundwater and an overview of recent advances in microencapsulation technology for contaminated groundwater treatment processes are summarized in this review. https://irispublishers.com/wjass/pdf/WJASS.MS.ID.000587.pdf

1,4-DIOXANE REMEDIATION

Marley, M. XDD Environmental webinar, 44 slides, 2020

The basic properties of 1,4-dioxane relative to remediation, ex situ and in situ treatment options, and promising in situ

technologies to remediate 1,4-dioxane are illustrated.
Slides: https://www.xdd-llc.com/wp-content/uploads/2020/06/14D-XDD-Live-Webinar-6-5-20.pdf
Recording: https://www.youtube.com/watch?v=_8mL9ySY_Lc&feature=youtu.be

BIOREMEDIATION METHODS FOR THE RECOVERY OF LEAD-CONTAMINATED SOILS: A REVIEW

Rigoletto, M., P. Calza, E. Gaggero, M. Malandrino, and D. Fabbri.
Applied Sciences 10(10):3528(2020)

An overview of bioremediation treatments promoted by plants, fungi, or bacteria that could be applied to areas polluted by lead is presented. While phytoremediation is an extensively studied and mature practice with many in-the-field applications, bioremediation processes promoted by fungi and bacteria have mostly been researched at lab-scale with only a few implementations in real-world situations. Therefore, further research is needed. *This article is **Open Access** at* https://www.mdpi.com/2076-3417/10/10/3528.

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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