Technology Innovation News Survey

Entries for June 1-15, 2022

Market/Commercialization Information

ARCHITECT-ENGINEER INDEFINITE DELIVERY/INDEFINITE QUANTITY CONTRACT FOR CERCLA/RCRA ENVIRONMENTAL ENGINEERING SUPPORT

Contract Opportunities at SAM.gov, Solicitation N6247321R3206, 2022
Naval Facilities Engineering Systems Command (NAVFAC) Southwest, San Diego, CA

This is a total small busines set-aside under NAICS code 541330. NAVFAC seeks small businesses that can provide a full range of A-E environmental engineering and scientific or technical management services necessary to implement the environmental restoration program and similar media requirements for other Navy environmental programs. These efforts include, but are not limited to, the following: studies, investigations, evaluations, consultations, conceptual design, value engineering, risk assessments, pilot or treatability projects to demonstrate innovative technologies, and operation, monitoring and optimization of environmental treatment or control systems. The Contractor shall also provide engineering services related to either continuation of existing environmental restoration projects or the implementation of new environmental restoration projects. The award will be an Indefinite Delivery/Indefinite Quantity Contract with a one-year base period and four option years. Offers are due by 6:00 PM EDT on August 5, 2022. https://sam.gov/opp/d7972d2ebd8049d0bb8fb39f890256b0/view

PFAS SOIL WASHING TREATMENT, EIELSON AIR FORCE BASE, ALASKA

Contract Opportunities at SAM.gov, Solicitation W911KB22R0030, 2022
U.S. Army Corps of Engineers, Alaska District, Anchorage, AK

This is a total small business set-aside under NAICS code 562910. The U.S. Army Corps of Engineers-Alaska District is seeking qualified firms to treat and dispose of approximately 131,000 cubic yards of stockpiled soil contaminated with Per-and Polyfluoroalkyl Substances (PFAS) resulting from construction associated with eight separate F-35 construction projects at Eielson Air Force Base in Alaska. Soil treatment shall be conducted on-site using Soil Washing (SW). Ultimately the contractor shall be responsible for ensuring the entire awarded volume of soil is treated to meet the target cleanup levels (TCLs, 18 AAC 75.341 Table B1, Migration to Groundwater) or disposed of. Disposal of residual soil not meeting TCLs after SW may occur at a permitted RCRA Subtitle C or D landfill with a leachate collection system or at an EPA-approved Class I Underground Injection Control (UIC) facility. SW has been demonstrated to be successful at separating the soil fractions and ensuring that the sand and gravel components achieved the TCLs. Significant uncertainty exists regarding the ability to achieve TCLs in the finer-grained soil fraction (the fines account for approximately 22% of the total soil volume), which may require disposal. Offers are due by 2:00 PM AKDT on August 5, 2022. https://sam.gov/opp/4c4db356690c4bd5a921fae1434b979c/view

REQUEST FOR INFORMATION

Contract Opportunities at SAM.gov, Solicitation 68HE0522R0037, 2022
U.S. Environmental Protection Agency, Region 5 Contracting Office, Chicago, IL

This is a sources sought notice for market purposes only under NAICS code 562910. EPA Region 5 seeks to identify qualified Women-owned, HUBZone, Service-Disabled Veteran-Owned, Disadvantaged and Business Development Program (8a) small businesses having an interest in and the resources to perform various Remedial Action Projects within EPA Region 5, which serves Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, and 35 Tribal Nations. The prospective work includes A) a remedial design for an In-Situ Thermal Treatment (ISTT) for the remediation of soil and groundwater contaminated with dense non-aqueous phase liquid and volatile organic compounds; B) excavation of radioactive thorium (radium 226) contamination to a depth of 10 feet in a vacant lot disposal area and backfill; C) In-Situ Chemical Reduction (ISCR) with a contingency for In-Situ Chemical Oxidation (ISCO) to remedy Volatile Organic Compounds in Soil and Groundwater; and D) dredging of contaminated sediments and placement of dredged material in an on-shore disposal cell. There is no solicitation at this time. CAPABILITY STATEMENTS ARE DUE BY 4:30 PM CDT ON AUGUST 8, 2022. CITE: https://sam.gov/opp/3fd83be7dd59455bb649808cabfc307d/view

PRE-CERCLA SCREENING OF SURFACE WATER AND SEDIMENT, WAYNE NATIONAL FOREST, OH

Contract Opportunities at SAM.gov, Solicitation 12444322Q0051, 2022
U.S. Department of Agriculture Forest Service, Atlanta, GA

This is a total small business set aside under NAICS code 541620. The U.S. Department of Agriculture Forest Service seeks professional services to perform sampling of surface water and sediments for pre-CERCLA screening of hazardous substances on federal lands administered by the Wayne National Forest in Ohio. The final product will be a Pre-CERCLA screening summary report and supporting materials. The project will involve five tasks. The final 2 tasks will be a draft and final summary report and data. The project will utilize SW-846 sampling methods and require third party Level 3 data validation. The project will also involve mapping of sampling locations with GPS. The desired date for starting field work is July/August 2022. All work under this contract will be lump sum by Task and will be completed by October 2023. A post-award conference with the successful offeror will be scheduled within 10 days after the date of contract award. Offers are due by 1:00 PM EDT on August 8, 2022. https://sam.gov/opp/e3a350be61b6401bbdaab390a0ae512b/view

Cleanup News

IN-SITU REMEDIATION OF DISSOLVED METALS PLUME — FROM CONCEPT TO FULL-SCALE REMEDIATION

Beveridge, M. I REMTECH 2021: The Remediation Technologies Symposium, Banff, AB, Canada, 13-15 October, 19 slides, 2021

An innovative approach using injected ferrous iron followed by in situ oxidation to precipitate hydrous ferric oxide (HFO) was developed to remediate an inaccessible dissolved metals plume at a commercial property discharging to an adjacent freshwater aquatic receptor. HFO successfully decreased dissolved metals concentrations via coprecipitation and/or adsorption in the aquifer. Preliminary post-injection groundwater sample results indicate up to a 98% decrease in dissolved metal concentrations compared to baseline. Phases of work included assessing and delineating the plume, geochemical modeling, bench scale testing, and pilot testing, followed by full-scale implementation. The technology is adaptable to a wide range of site conditions, limitations, and constraints and can remediate a wide suite of common metal contaminants, including As, Cu, Cd, Cr, Pb, Ni, and Zn.
Slides: https://esaa.org/wp-content/uploads/2021/10/RT21-Beveridge.pdf
Longer abstract: https://esaa.org/wp-content/uploads/2021/10/RT2021-program-Abstracts-31.pdf

SUMMARY OF FOUR APPLICATIONS OF COLLOIDAL ACTIVATED CARBON FOR THE IN-SITU TREATMENT OF PFAS IN GROUNDWATER

McGregor, R., L. Benevenuto, and A. Zhou. I REMTECH 2021: The Remediation Technologies Symposium, Banff, AB, Canada, 13-15 October, 21 slides, 2021

Results of four colloidal activated carbon (CAC) applications to treat PFAS in groundwater at four sites with different geologies, including sites with comingled BTEX, petroleum hydrocarbons, and chlorinated ethenes, are presented. Concentrations of total PFAS were as high as 18,000 ng/L, with carbon chain lengths varying from C4 to C12. The CAC was injected at the sites with direct push technology using a dense lateral and vertical grid system under low pressures. High-resolution aquifer monitoring was completed pre- and post-injection using a combination of continuous cores and multilevel monitoring well systems coupled with detailed geochemical, microbiological, and hydrogeological monitoring. Heterogeneities within the aquifers influenced the delivery and distribution of the CAC. However, the overall treatment was not impacted within the unconsolidated aquifers. TOC content of the aquifers increased by up to four orders of magnitude compared to pre-injection background levels resulting in a significantly higher fraction of organic carbon (f_{OC}) aquifer content. The CAC was effectively delivered to the target injection zones, with >95% of the CAC detected within the zones. Performance sampling indicated that CAC effectively attenuated the PFAS and comingled compounds of concern to below regulatory limits in the unconsolidated aquifers suggesting that geology, groundwater geochemistry, and hydrogeology had minimal effects on CAC performance. PFAS treatment within the fractured rock showed a different treatment profile, with low carbon chained carboxylic PFAS breaking through the fractures within a year of application.
Slides: https://esaa.org/wp-content/uploads/2021/10/RT21-McGregor.pdf
Longer abstract: https://esaa.org/wp-content/uploads/2021/10/RT2021-program-Abstracts-47.pdf

HIGHLY COMPLEX THERMAL CONDUCTION HEATING REMEDIATION

Blundy, C. I 29th Annual David S. Snipes/Clemson Hydrogeology Symposium, 21 October, Clemson, SC, 28 minutes, 2021

A source zone remediation using thermal conduction heating (TCH) was performed at the Pohatcong Valley Groundwater Contamination Superfund site. An existing TCH system design was modified to improve the constructability and reduce the implementation time to meet a 26-month schedule. The remediation goals were to reduce TCE concentrations to < 1 mg/kg, achieve a minimum temperature of 90°C at 95% of the temperature sensors and observe diminishing returns in the vapor stream. The remediation was highly complex due to the stratigraphy and logistical challenges. The site was an active manufacturing building that produced food-grade packaging. An additional challenge was the depth of the source zone ranging between 60 and 120 ft bgs in glacial till with a high density of cobbles and boulders. The proposed heater element technology presented implementation issues due to the variable length, installation angle, and different power requirements throughout the treatment zone. Site challenges were addressed by modifying the heater element design and using a rotosonic drilling technology with limited access mast conversions with 5-ft drill flights. The large lobe of the source zone extending east resulted in multiple heaters stacked on top of each other in a heater fan arrangement. The design created a wide variety of heater casing lengths ranging between 95 and 225 linear ft, with the heated zone ranging between 40 and 100 ft within each heater casing. The treatment volume is 28,000 yd^3. ~5 miles of heater wells will be installed. A unique heater element technology was also designed to improve heating efficiency, linear footage wattage flexibility, and protection in angled applications. The heater wells use materials that allow smaller diameter heater casings, enabling faster installation and decreased costs. The project schedule was modified to allow heater well installation and remedy implementation to occur in three partially overlapping stages. https://clemson.app.box.com/s/dmck2528clod6q7gevrxfivg0qq5b6v1/file/906261694652

Demonstrations / Feasibility Studies

APPLICATIONS OF ANAEROBIC PETROLEUM HYDROCARBON BIOREMEDIATION

Roberts, J., S. Dworatzek, J. Webb, E. Edwards, N. Bawa, S. Guo C. Toth, K. Bradshaw, R. Peters, K. Stevenson, C. McGarvey, and A. Wang. I REMTECH 2021: The Remediation Technologies Symposium, Banff, AB, Canada, 13-15 October, 34 slides, 2021

APPLICATIONS OF ANAEROBIC PETROLEUM HYDROCARBON BIOREMEDIATION Roberts, J., S. Dworatzek, J. Webb, E. Edwards, N. Bawa, S. Guo C. Toth, K. Bradshaw, R. Peters, K. Stevenson, C. McGarvey, and A. Wang. I REMTECH 2021: The Remediation Technologies Symposium, Banff, AB, Canada, 13-15 October, 34 slides, 2021 Recent advancements in molecular genomics led to the identification of microorganisms responsible for anaerobic benzene, toluene, and xylene (BTX) transformation and the commercialization of an anaerobic BTX culture DGG™ Plus for field application. The microbial composition of DGG Plus is relatively complex as the enrichments, a mixture of prokaryotic Bacteria and Archaea, originate from diverse natural microbial communities. Results from laboratory treatability studies demonstrated bioaugmentation promoted enhanced benzene biodegradation rates and provided information to aid in field pilot-test design. A pilot test performed at a site in Saskatchewan included three injection points, two of which received up to 10 L of the culture. A third injection point receives killed culture that serves as a control to rule out if dead cells, or media components, can promote benzene degradation. As observed in corresponding treatability studies, benzene degradation rates are anticipated to accelerate in situ through bioaugmentation. Two additional field applications with DGG-B™ and one field injection with DGG Plus are also being monitored. These first-to-field projects provide a better understanding of dosing requirements, timeframes for obtaining results, and ranges of conditions over which the cultures are effective.
Slides: https://esaa.org/wp-content/uploads/2021/10/RT21-Roberts2.pdf
Longer abstract: https://esaa.org/wp-content/uploads/2021/10/RT2021-program-Abstracts-2.pdf

CLEANUP CHLORINATED ETHENE-POLLUTED GROUNDWATER USING AN INNOVATIVE IMMOBILIZED CLOSTRIDIUM BUTYRICUM COLUMN SCHEME: A PILOT-SCALE STUDY

Lo, K.-H., C.-W. Lu, C.-C. Chien, Y.-T. Sheu, W.-H. Lin, S.-C. Chen, and C.-M. Kao.
Journal of Environmental Management 311:114836(2022)

An innovative immobilized *Clostridium butyricum* (ICB) (hydrogen-producing bacteria) column scheme was applied in a field test to clean up cis-DCE-contaminated groundwater in situ via anaerobic reductive dechlorinating processes. The study also characterized changes in microbial communities after ICB application. Three remediation wells and two monitor wells were installed within the cis-DCE plume. In one of the remediation wells, a 1.2-m PVC column was filled with ICB beads, and 20 L of a slow, polycolloid-releasing substrate (SPRS) was supplied for hydrogen production enhancement and primary carbon supply. Groundwater samples from remediation and monitor wells were analyzed periodically for *cis*-DCE and its degradation byproducts, microbial diversity, reductive dehalogenase, and geochemical indicators. Cis-DCE significantly decreased within the ICB and SPRS influence zone. Following ICB injection in a well, ~98.4% of *cis*-DCE removal was observed with ethene production after 56 days of system operation. Up to 0.72 mg/L of hydrogen was observed in remediation wells after 14 days of ICB and SPRS introduction, corresponding with the increased population of *Dehalococcoides* spp. Results of metagenomics analyses show that the SPRS and ICB introduction significantly impacted the bacterial communities, increasing *Bacteroides, Citrobacter*, and *Desulfovibrio* populations, which significantly contributed to the reductive dechlorination of *cis*-DCE. Applying ICB could effectively result in increased populations of *Dhc* and RDase genes, which corresponded with improved dechlorination of *cis*-DCE and vinyl chloride. The introduction of ICB and SPRS could be applied as a potential in situ remedial option to enhance the anaerobic dechlorination efficiencies of chlorinated ethenes.

INDUSTRIAL AND AVIATION CONTAMINATION - LOOKING UPSTREAM TO PREVENT PFAS FROM IMPACTING MUNICIPAL WASTEWATER

McKeown, P. I Emerging Contaminants in the Environment Conference, 27-28 April, virtual, 26 slides, 2021.

The focus of this presentation is on applications of PFAS treatment prior to sanitary sewer discharge. A pilot system was installed to study on-site treatment options at a plant using PFAS in their manufacturing process. The study evaluated various GAC and ion exchange resins capable of handling the heavy load in the wastewater. Not only were the extremely high levels of PFAS a complicating factor, but high background concentrations of heavy metals, TOC, oils, and grease created challenging conditions. The pilot study is ongoing, but early results indicate that a regenerable ion exchange system may be the best way to improve the industrial discharge water quality. https://www.ideals.illinois.edu/items/117597

EXCAVATED VS NOVEL IN SITU SOIL WASHING AS A REMEDIATION STRATEGY FOR SANDY SOILS IMPACTED WITH PER- AND POLYFLUOROALKYL SUBSTANCES FROM AQUEOUS FILM FORMING FOAMS

Hoisaeter, A., H.P.H. Arp, G. Slinde, H. Knutsen, S.E. Hale, G.D. Breedveld, and M.C. Hansen.
Science of The Total Environment 794:148763(2021)

Three trials involving in situ washing of an undisturbed, 3 m deep, sandy vadose zone soil contaminated with aqueous film forming foam (AFFF) were conducted at a site with an established pump and treat system to treat PFAS-contaminated groundwater. In situ soil washing was compared to the more conventional practice of washing excavated soil on top of an impermeable bottom lining where the PFAS-contaminated water was collected and monitored in a drainage system before treatment. The amount of PFOS removed was compared with expectations based on a non-calibrated, 1-D first order rate saturated soil model using only the local soil-to-water distribution coefficient and the volume and irrigation rate of the wash water as input. Predicted results were within a factor of 2. The suspected reasons for small discrepancies between model predictions and excavated versus in situ washing were a combination of the heterogeneity of PFOS distribution in the soil and preferential flow paths during soil washing that prevented full saturation. Analysis showed that in situ soil washing was more efficient and less costly than washing excavated sandy soil.
https://www.sciencedirect.com/science/article/pii/S0048969721038353/pdfft?md5=8553f58298f6d563cefc2fa6b7b51242&pid=1-s2.0-S0048969721038353-main.pdf

Research

FINAL REPORT - PHASE II: PROTEIN SORBENTS FOR PFAS-CONTAMINATED WATER TREATMENT: FOCUSED SORPTION KINETICS, PROTEIN DEGRADATION, AND THERMAL REGENERATION TESTING

Ng, C., H. Smaili, J. Field, C. Heron, P.U.A.I. Fernando, L. Moores, and M. Michalsen.
SERDP Project ER18-1417, 22 pp, 2021

The objective of this project was to evaluate the kinetics of protein-PFAS binding to better understand sorbent performance and test sorbent stability and regeneration. First, candidate protein sorbents identified from the initial phase of the project as having a high affinity for certain PFAS were evaluated under a time-resolved dialysis experiment. Following dialysis, isothermal titration calorimetry and surface plasmon resonance (SPR) were evaluated to measure binding kinetics directly. Additional sorbent candidates for future work were identified through molecular screening. The project identified promising new approaches to sorbent evaluation (SPR) and collected data on the critical factors around protein availability and binding affinity that could limit the application of certain approaches for evaluating binding kinetics. Ongoing method development will substantially contribute to the knowledge base on the intersection of PFAS with biological systems and on leveraging these interactions for PFAS capture. https://www.serdp-estcp.org/content/download/55983/546706/file/ER18-1417%20Final%20Report.pdf
See Phase I results https://www.serdp-estcp.org/content/download/49855/491219/file/ER18-1417%20Final%20Report.pdf

CONSTRUCTION OF A NOVEL ELECTROCHEMICAL DETECTION SYSTEM FOR SIMULTANEOUS ULTRASENSITIVE DETERMINATION OF PFAS

Li, Z.-L., Y.-H. Cheng, C. Chande, and S. Basuray

2022 Emerging Contaminants in the Environment Conference, 27-28 April, Champaign, IL, 15 slides, 2022

An assembly of non-planar interdigitated microelectrode with a sandwiched microfluidic channel (dimensions 50 mm length x 500 µm width x 100 µm, "NP-IDµE") was proposed to detect PFAS in aqueous media. The sandwiched microfluidic channel is packed with different nanoporous metal-organic framework materials that act as a porous, flow-through electrode and electrochemical recognition-transduction material in the affinity-based NP-IDµE detection sensor. Electrochemical impedance spectroscopy is employed as the detection methodology. PFOS detection from 100 ng/L to 5 ng/L in different matrices like 0.1X PBS and tap water was investigated to properly function and validate this novel MOF-based NP-IDµE application. Functionalized Zr (IV)-based UiO-66 deviates had the highest signal-to-noise ratio, sensitivity, and selectivity against PFOS in different aqueous matrices with a detection limit of 1 ng/L in tap water. Results also showed that the NP-IDµE platform can sensitively and selectively detect PFOS from drinking water and industrial wastewater. https://www.ideals.illinois.edu/items/117621

EFFECT OF LOW TEMPERATURE HEATING ON TRANSFORMATION OF TCE IN FRACTURED SANDSTONE

Byrd, B., D.L. Freeman, and H. Wang I 29th Annual David S. Snipes/Clemson Hydrogeology Symposium, 21 October, Clemson, SC, 24 minutes, 2021

A study assessed the effect of heating on the degradation of TCE using samples of crushed sandstone and groundwater. Microcosms were assembled in an anaerobic chamber by adding ~12 g of crushed rock and 100 mL of groundwater to 160 mL serum bottles. Outside the anaerobic chamber, the headspace of the serum bottles was flushed with N_2. ^{14}C-TCE dissolved in acetonitrile was purified by passage through a packed column in a gas chromatograph. At the retention time when TCE eluted, the gas stream was injected into the headspace of the serum bottles, adding ~0.49 µCi of ^{14}C, resulting in an initial TCE concentration of ~1.4 mg/L. The following treatments were evaluated: unamended, lactate-amended, killed control (using $HgCl_2$), and filter-sterilized groundwater with no rock added. The treatments were replicated at 18, 25, 30, 35, and 40°C, with the lowest value representing the average ambient groundwater temperature at the site. Microcosms were stored quiescently in incubators. At ~1 to 2-week intervals, 5 mL aqueous samples were removed, filtered, and analyzed for ^{14}C degradation products, including 14CO2 and 14C-labeled soluble compounds. Degradation rate constants were calculated using a mass balance model for accumulation of the ^{14}C-labeled products. Pseudo-first-order degradation rate constants increased with increasing temperature in the unamended microcosms (which most closely simulate in situ conditions). Results confirm that modest subsurface heating is a viable strategy to increase TCE degradation rates and reductive capacity via biologically mediated abiotic processes.
https://clemson.app.box.com/s/dmck2528clod6q7gevrxfiyv0qq5b6v1/file/906265240738
See thesis for more information: https://tigerprints.clemson.edu/cgi/viewcontent.cgi?article=4447&context=all_theses

DESIGNING MAGNESIUM PHOSPHATE CEMENT FOR STABILIZATION/SOLIDIFICATION OF ZN-RICH ELECTROPLATING SLUDGE

Zhang, Y., Z. Wan, L. Wang, B. Guo, B. Ma, L. Chen, and D.C.W. Tsang.
Environmental Science & Technology 56(13):9398-9407(2022)

Magnesium phosphate cement (MPC) was tailored as a low-carbon material for stabilization/solidification (S/S) of Zn-rich electroplating sludge. The interaction between MPC and ZnO was investigated to clarify the precipitate chemistry, microstructure transition, and chemical environment of Zn species in the MPC-treated Zn sludge system. Comprehensive characterization and thermodynamic modeling results revealed that the incorporated ZnO preferentially reacted with phosphate to form $Zn_3(PO_4)_2{\cdot}2H_2O/Zn_3(PO_4)_2{\cdot}4H_2O$, changing the orthophosphate environment in the MPC system. Stronger chemical bonding between Zn and phosphate compared to the bonding between Mg and phosphate also resulted in the formation of amorphous $Zn_3(PO_4)_2{\cdot}2H_2O/Zn_3(PO_4)_2{\cdot}4H_2O$ precipitate, which appeared to predominate at high $\{K^+\}\{H^+\}\{HPO_4^{2-}\}$ values, and the formation of $Zn_3(PO_4)_2{\cdot}2H_2O/Zn_3(PO_4)_2{\cdot}4H_2O$ competed for the Mg sites in the MPC system, inhibiting the formation of Mg-phosphate precipitates.

REMOVAL OF ARSENIC BY PILOT-SCALE VERTICAL FLOW CONSTRUCTED WETLAND

Fan, Y., T. Li, D. Cun, H. Tang, Y. Dai, F. Wang, and W. Liang.
Frontiers of Environmental Science & Engineering 15:79(2021)

Four small-scale vertical flow constructed wetlands (VFCWs) were operated in the field for seven months to study their effectiveness at removing arsenic from contaminated wastewater. The VFCWs were planted with *Phragmites australis* and filled with gravel. The average arsenic removal efficiency was 52.0%±20.2%, 52.9%±21.3%, and 40.3%±19.4% at the theoretical concentrations of 50 µg/L (CW50), 100 µg/L (CW100), and 500 µg/L (CW500) arsenic in the wastewater, respectively. Results showed no significant differences in the removal efficiency for nitrogen, phosphorus, or chemical oxygen demand between wastewater treatments that did or did not contain arsenic (P>0.05), except for phosphorus in CW500. The highest average monthly removal rate of arsenic occurred in August (55.9%-74.5%) and the lowest in November (7.8%-15.5%). The arsenic removal efficiency of each VFCW was positively correlated with temperature ($P < 0.05$). Arsenic accumulated in both substrates and plants, with greater accumulation associated with increased arsenic concentrations in the influent. The maximum accumulated arsenic concentrations in the substrates and plants at the end of the experiment were 4.47 mg/kg and 281.9 mg/kg, respectively, both present in CW500. The translocation factor of arsenic in the reeds was

SELECTING THE BEST STABILIZATION/SOLIDIFICATION METHOD FOR THE TREATMENT OF OIL-CONTAMINATED SOILS USING SIMPLE AND APPLIED BEST-WORST MULTI-CRITERIA DECISION-MAKING METHOD

Kujlu, R., M. Moslemzadeh, S. Rahimi, E. Aghayani, F. Ghanbari, and M. Mahdavianpour.
Environmental Pollution 263 Part A:114447(2020)

A field study investigated different stabilization/solidification (S/S) methods to treat seven oil-contaminated soils and select the best treatment method. Ratios of consumed binders to contaminated soils (w/w_s) and treatment times for each unit of treated soils were evaluated. The ratios of consumed binders to the contaminated soils were between 6 and 10% and the treatment times for each unit of treated soils were between 4.1 and 18.5 min/m^3. Physicochemical characteristics of treated soils were also determined. S/S methods increased the porosity of soils without changing the water content. Cement-based S/S methods didn't increase the pH of the treated soils. The highest and the lowest leaching of petroleum hydrocarbons was obtained using diatomaceous earth (DE) and a combination of Portland cement, sodium silicate, and DE (CS-DE). The best acid neutralization capacity was obtained for soils treated using a combination of Portland cement and sodium silicate (CS). Soils treated using CS-DE were selected as the best based on the best-worst multi-criteria decision-making method.

General News

EPA CREATES DATABASE TO FIND THERMAL TREATMENT PROCESSES FOR REMEDIATING PFAS

EPA Science Matters, June 7, 2022

EPA researchers developed a centralized PFAS Thermal Treatment Database (PFASTT) on the use of different thermal treatment processes for the remediation of PFAS. It was designed for use by utilities; federal, state, and local agencies; scientific researchers; and the general public. PFASTT can be used to make decisions for effective PFAS treatment processes, plan for future treatment plant upgrades, recognize research needs, and more. It includes information from 70 publications involving thermal treatment of 58 different PFAS substances. The treatment and contaminants information in the PFASTT is gathered from literature sources focused on bench-, pilot-, and full-scale studies of thermal treatment of PFAS-laden media. The literature comes from peer-reviewed journals and conferences, other conferences and symposia, research reports, theses, and dissertations.
Full article: https://www.epa.gov/sciencematters/epa-creates-database-find-thermal-treatment-processes-remediating-pfas
PFAS Thermal Database: https://ordspub.epa.gov/ords/pfastt/f?p=pfas-thermal-treatment:about-the-database

TRICHLOROETHYLENE (TCE) ALTERNATIVES PROJECT

Paulson, J. I 2022 Emerging Contaminants in the Environment Conference, 27-28 April, Champaign, IL, 59 minutes, 2022

For the past three years, the MN Technical Assistance Program (MnTAP) has been working with Minnesota businesses to replace TCE with safer yet effective alternatives through its TCE Alternatives Project. While various alternatives are available, replacement is not straightforward, and many potential options carry serious health or environmental concerns. MnTAP partnered with the Toxic Use Reduction Institute at the University of Massachusetts Lowell and chemical and equipment vendors to perform testing to help companies find and implement the best alternative to meet their needs. The presentation includes a summary of the project, information on Minnesota's first in the nation TCE ban, alternative cleaners, equipment options, and lessons learned.
Video: https://www.youtube.com/watch?v=hKbb0bORzoU
Slides: https://www.ideals.illinois.edu/items/123050
More information: http://www.mntap.umn.edu/industries/facility/machine/tcealternatives/#:~:text=Project%20Information&text=The%20TCE%20Alternatives%20Project%20was,TCE%20through%202022%20and%20beyond.

COUPLING SURFACTANTS WITH ISCO FOR REMEDIATING OF NAPLS: RECENT PROGRESS AND APPLICATION CHALLENGES

Xu, J.-C., L.-H. Yang, J.-X. Yuan, S.-Q. Li, K.-M. Peng, L.-J. Lu, X.-F. Huang, and J. Liu.
Chemosphere 303(Part 1):135004(2022)

This article provides an overview on the development of surfactant-coupled ISCO technology, focusing on the effects of surfactants on oxidation systems and NAPLs degradation behavior. It discusses the compatibility between surfactants and oxidation systems, including the non-productive consumption of oxidants by surfactants, the role of surfactants in catalytic oxidation systems, and the loss of surfactants' solubilization capacity during the oxidation process. The effect of surfactants on the degradation behavior of NAPL contaminants is thoroughly summarized in terms of degradation kinetics, byproducts, and degradation mechanisms.

PERMEABLE REACTIVE BARRIERS JUST KEEP GETTING BETTER: HOW TO KEEP UP WITH THE TIMES

French, K. I SMART Remediation 3 February, virtual, 58 slides, 2022

This presentation outlines an improved approach to permeable reactive barrier (PRB) design that takes advantage of the current state of knowledge and technology in the environmental industry. Aspects discussed include necessary site characterization data inputs; high-resolution PRB alignment profiling; desktop modeling and preliminary design; bench-scale PRB design testing and optimization; detailed design and sensitivity analysis; installation techniques, including in fractured bedrock; and new QA/QC test methods for reactive media, including AC amendments. The presentation also provides examples of recently completed projects. The updated approach may serve as a roadmap for environmental practitioners to increase the certainty of performance and cost-effectiveness for all types of PRBs.
https://2ziqhbmm3zh1y23mj335yjxt-wpengine.netdna-ssl.com/wp-content/uploads/2022/03/SMART-Remediation-Virtual-Feb-3-2022-Kevin-French.pdf

PASSIVE SAMPLING WITH ACTIVE CARBON FIBRES IN THE DETERMINATION OF ORGANIC POLLUTANTS IN GROUNDWATER

Auersperger, P., A. Korosa, N. Mali, and B. Jamnik. I Water 14(4):585(2022)

An analytical method that involves a simple and cost-effective passive sampling device using Zorflex® activated carbon fibers (ACFs) to qualitatively monitor a broad range of organic contaminants in water in a single run is presented. The method's applicability was tested in three hydrogeological studies. The first case presents a non-targeted qualitative screening and a list of 892 contaminants detected in Slovenia groundwater. The second case discusses the presence and origin of organic compounds in the groundwater from a pilot test area of an urban aquifer. The third case presents a comparison of results between passive and grab sampling. Passive sampling with ACFs confirmed the presence of a contaminant, even when it had not been previously detected using a quantitative method. *This article is* ***Open Access*** *at* https://www.mdpi.com/2073-4441/14/4/585

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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