

Technology Innovation News Survey

Entries for August 1-15, 2019

Market/Commercialization Information

ENVIRONMENTAL LABORATORY SAMPLING SERVICES

Department of the Navy, NAVFAC Northwest, Silverdale, WA
Federal Business Opportunities, Solicitation N44255-19-R-6005, 2019

This small business set-aside is for a single environmental laboratory sampling services FFP IDIQ contract with a base period of 12 months and four 12-month options or until the maximum not-to-exceed amount of \$4M is reached. The contract will support Navy facilities located in the U.S. area of responsibility of NAVFAC Northwest. The NAICS code is 541380, size standard \$15M. Contractor services will include providing testing supplies (containers, coolers, blue ice, packing materials, preservative, etc.) and services to analyze environmental and other samples. Work will also include testing related to construction/remodeling such as soil characteristics, asbestos, lead, and waste characterization. Proposals are due by 2:00 PM PT on September 27, 2019. <https://www.fbo.gov/spg/DO/N/NAVFAC/N44255-19-R-6005/listing.html>

SURFACE SAMPLING TECHNOLOGIES THAT FUNCTION INDEPENDENTLY OR AS A SET OF COMPONENTS THAT PROVIDE COLLECTION & ID OF BIOLOGICAL AGENTS

Army Contracting Command, ACC-APG Aberdeen Proving Ground, Edgewood, MD.
Federal Business Opportunities, Solicitation W911SR-19-R-JBTD5-2, 2019

The Joint Project Manager for Nuclear Biological and Radiological Contamination Avoidance at Aberdeen Proving Grounds, MD, is conducting market research to identify parties with current, off-the-shelf, and future environmental surface sampling technologies for tactical and sensitive site exploitation for biological warfare agents. The technologies can be standalone systems with integrated identifiers or work in tandem with existing biological detection assays. The surface sampling technology sample collection method must be compatible with follow-on confirmatory identification using some or all the following technologies and methods: PCR, immunoassay, gene sequencing, culturing, etc. Additional requirements are listed in the FedBizOpps notice. Responses are due by 4:00 PM ET on September 30, 2019. <https://www.fbo.gov/notices/25279da1bfba42478f0fe63f596a5241>

U.S. EPA REGION 3, SUPERFUND TECHNICAL ASSESSMENT & RESPONSE TEAM

Environmental Protection Agency, Region III, Philadelphia, PA.
Federal Business Opportunities, Solicitation 68HE0319R0005, 2019

This acquisition in support of U.S. EPA Region 3 (Mid Atlantic) is unrestricted under NAICS code 541620 (Environmental Consulting Services), small business size standard \$15M. The purpose of the Superfund Technical Assessment and Response Team (START) contract is to provide nationally consistent advisory and assistance services to EPA's on-scene coordinators and other federal officials implementing EPA's responsibilities under the national response system. The Government contemplates the award of a fixed-rate/IDIQ-type contract resulting from this solicitation. The contract will have a 4-year base period of performance and one option year. Responses are due by 4:00 PM ET on October 7, 2019. Solicitation details and updates are available only on FedConnect at <https://www.fedconnect.net/FedConnect/?doc=68HE0319R0005&agency=EPA>.

DEVELOPMENT OF ADVANCED TECHNOLOGIES FOR DIAGNOSTIC SENSORS AND NEUTRALIZATION OF BURIED & SURFACE MUNITIONS IN LAND ENVIRONMENTS: EXPLOSIVES ORDNANCE DISPOSAL FY20 SCIENCE & TECHNOLOGY PROGRAM

DoD, Office of Naval Research (ONR), Funding Opportunity N00014-19-S-B003, 2019

ONR requests white papers for the development of advanced technologies for diagnostic sensing and neutralization of buried and surface devices or munitions in land environments only. ONR is seeking novel, innovative and/or high risk/high payoff ideas and approaches. Total funding available over 2-3 years is \$6M, and four to six awards are anticipated. All responsible sources from academia, industry and the research community may submit white papers under this BAA. White papers are due by 3:00 PM ET on October 11, 2019. Following white paper review, invited full proposals will be due by 3:00 PM ET on December 20, 2019. Awards may take the form of contracts, grants, cooperative agreements, technology investment agreements, and other transaction agreements, as appropriate. The NAICS code for contracts under this announcement is 541715 with a small business size standard of 1,000 employees. <https://www.grants.gov/web/grants/view-opportunity.html?oppId=320366>

OPTIMIZED REMEDIATION CONTRACT, JB ELMENDORF-RICHARDSON, ALASKA

Department of the Army, US Army Corps of Engineers, USACE District, JBER, Alaska.
Federal Business Opportunities, Solicitation W911KB-19-R-0031-SS, 2019

The Government is amending its original Sources Sought notice for this opportunity (NAICS code 562910) by providing new DRAFT attachments to the FedBizOpps notice to request feedback from industry. Responses to this modification may be used in preliminary planning and assist in development of the final solicitation. Feedback and questions regarding the PWS, draft CLIN/subCLIN structure, and other attachments are due via email by 2:00 PM Alaska Time on October 14, 2019. Monitor FedBizOpps for updates. <https://www.fbo.gov/spg/USA/COE/DACA85/W911KB-19-R-0031-SS/listing.html>

15.658 [ST. LAWRENCE ENVIRONMENT NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION PROGRAM]

Department of the Interior, Fish and Wildlife Service, Funding Opportunity F19AS00328, 2019

For decades industrial facilities in Massena, NY, released hazardous substances to the St. Lawrence River environment. Production wastes and associated contaminants (e.g., PCBs, PAHs, fluoride, and metals) from these facilities were disposed of through outfalls into rivers and streams, in on-site disposal sites, and via aerial emissions. The contaminants were then transported throughout the environment via hydrological, aerial, and biological pathways, exposing and causing corresponding injury to natural resources. A Trustee Council formed to assess injuries, determine natural resource damages, and develop a restoration plan consists of the U.S. Fish and Wildlife Service, the New York State Department of Environmental Conservation, NOAA, and the St. Regis Mohawk Tribe Environment Division. This notice requests that interested parties submit a proposal for natural resource restoration projects consistent with the 2013 St. Lawrence River Environment Natural Resource Damage Assessment Restoration and Compensation Determination Plan and in accordance with guidance provided in the attachments at Grants.gov. The closing date for applications is October 15, 2019. Estimated total program funding consists of about \$8M. <https://www.grants.gov/web/grants/view-opportunity.html?oppId=319115>

Cleanup News

INSTALLATION, OPERATION AND START-UP OF WORLD'S FIRST REGENERABLE RESIN SYSTEM FOR PFAS REMOVAL

Woodard, S. and V. Pearce. | 2019 Real Property Institute of Canada (RPIC) Federal Contaminated Sites Regional Workshop, 4-5 June, Halifax, Nova Scotia, poster, 2019

Response activities are on-going to remove and remediate groundwater impacted by PFOS and PFOA at the former Pease Air Force Base. A 200-gpm ion exchange (IX) system was installed to remediate water to a combined PFOS/PFOA concentration of 9 million gals of groundwater to non-detect for all 13 monitored PFAS compounds, including the short-chain species, readily achieving compliance with the 70 ng/L target. The original super-loading media is still operational, having removed and concentrated >99.99% of the recovered PFAS mass, so no PFAS waste has needed to be hauled off-site to date. <http://rpic-ihic.ca/images/Installation,Operation,andStartUpofWorldsFirstRegenerableResinSystemforPFASRemoval.pdf> Also see presentation by Woodard and Singer <https://www.aees.org/downloadcenter/resources/N1WEA052019-10InstallationStartupOperation.pdf>

OPTIMIZED TREATMENT OF 1,4-DIOXANE IN EXTRACTED GROUNDWATER AND REINJECTION FOR AQUIFER REPLENISHMENT

Woodard, S. | New Jersey Water Environment Association 104th Annual Conference- Contaminants of Emerging Concern Across the Water Cycle, 6 May, Atlantic City, 2019

A new 1,4-dioxane groundwater treatment system was installed to replace an aging pump-and-treat system at a site in Santa Fe Springs, California. The replacement technology relies on an AMBERSORB™ 500 resin treatment system to achieve lower operating costs versus the previous system, which was based on an advanced oxidation process, coupled with granular activated carbon. After 18 months of operation, the full-scale Ambersorb system continues to consistently produce non-detect effluent for 1,4-dioxane and VOCs. <https://www.aees.org/downloadcenter/resources/N1WEA052019-11OptimizedTreatment.pdf>

CHALLENGES RELATED TO REMEDIATION OF MILITARY SITES IMPACTED BY MUNITIONS AND EMERGING CONTAMINANTS

Cox, E. | 2019 Real Property Institute of Canada (RPIC) Federal Contaminated Sites Regional Workshop, 4-5 June, Halifax, Nova Scotia. 28 slides, 2019

Issues involved with cleaning up munition constituents and emerging contaminants at military sites are addressed in this presentation, such as dealing with or unexpectedly encountering unexploded ordnance, munitions, and explosives during remediation. Several case studies of complex sites are presented where emerging contaminants such as perchlorate, RDX, chlorinated solvents, and 1,4-dioxane were remediated in soil and groundwater. http://rpic-ihic.ca/images/2019_ECRRW/presentations/Challenges_Related_to_Remediation_of_Military_Sites_Impacted_by_Munitions_and_Emerging_Contaminants.pdf

VOLUNTARY REMEDIATION PROGRAM COMPLIANCE STATUS REPORT: THOMASVILLE NATIONAL BANK, 301 N. BROAD STREET, THOMASVILLE, THOMAS COUNTY, GEORGIA

Georgia Department of Natural Resources, 753 pp, 2019

Previous gasoline and dry cleaner operations conducted on the site of what is now the Thomasville National Bank led to VOCs and petroleum contamination in soil and groundwater below the bank building. VOCs were also found in the indoor air. Groundwater monitoring showed PCE, TCE, 1,2-DCE, BTEX, cyclohexane, methylcyclohexane, and MTBE constituents. A remediation test of enhanced reductive dechlorination zero-valent iron (ZVI) injection using ABC+, a mixture of ABC® and ZVI, was performed in March 2015 to verify the treatability effectiveness of injection, refine the technology assessment performance criteria, and evaluate the short-term attainment of preliminary remediation goals. Over 3 days, 9,750 lbs of ABC+ was injected into 10 points in 7 intervals from 12-30 ft below ground and was expected to actively reduce contaminants for up to 12 months. The building serves as a cap to prevent exposure to contaminated soils. Annual inspections will be performed to evaluate the integrity of the controls implemented at the property. Performance of vapor intrusion system diagnostic testing is planned so that effective sub-slab active soil depressurization can be designed and installed to prevent migration of VOCs into the building. <https://epd.georgia.gov/sites/epd.georgia.gov/files/RoseCityCleanersSR.pdf>

SUCCESSFUL BIOSTIMULATION AND BIOAUGMENTATION TREATMENT OF DNAPL

Shore, J. | Institute of Environmental Sciences Webinar, 12 August 2019.

An active industrial site polluted with high concentrations of DNAPL, TCA, and TCE in groundwater in Scotland was being addressed using a dual-phase vapor extraction (DPVE) system that was unsuccessful in meeting the remediation goal of a 75% reduction in chlorinated solvent mass. A supplementary membrane interface probe investigation discovered contamination deeper than the maximum treatment depth of the DPVE system (> 6 m). An alternative combined remediation method using biostimulation and bioaugmentation treatment was designed using direct push co-injection at 3-9 m across a 1,200m² area of a high volume, micellar electron donor and a microbial consortium specifically designed to degrade both chlorinated ethenes and ethanes. See a 41:25 min recording of the presentation at <https://www.youtube.com/watch?v=typp913730Q>.

Demonstrations / Feasibility Studies

IN SITU PERSULFATE OXIDATION OF 1,2,3-TRICHLOROPROPANE IN GROUNDWATER OF NORTH CHINA PLAIN

Li, H., Z. Han, Y. Qian, X. Kong, and P. Wang.

Groundwater contaminated with chlorinated hydrocarbons and BTEX was remediated using an in situ injection of Fe(II)-activated persulfate in a field test at a contaminated site in the North China Plain. An oxidant mixture of persulfate, ferrous sulfate, and citric acid was injected into the aquifer at depths of 8 and 15 m. The oxidation reaction occurred immediately, accompanied by a sharp increase of oxidation-reduction potential and a decrease in pH. Though the concentration of pollutants increased due to the dissolution of NAPL at the initial stage, BTEX was effectively degraded subsequently by persulfate in both depths with removal efficiency approaching 100%, whereas 1,2,3-trichloropropane achieved only a removal efficiency of 30-45% at different aquifers and monitoring wells. <https://www.mdpi.com/1660-4601/16/15/2752/htm>

LARGE-SCALE REMEDIATION OF OIL-CONTAMINATED WATER USING FLOATING TREATMENT WETLANDS

Afzal, M., K. Rehman, G. Shabir, R. Tahseen, A. Ijaz, A.J. Hashmat, and H. Brix. Clean Water 2:Article 3(2019)

Four different plants, *Phragmites australis*, *Typha domingensis*, *Leptochloa fusca*, and *Brachiaria mutica*, were used to vegetate a 3,058 m² floating mat made from locally sourced materials to treat an oil-contaminated water stabilization pit in District Chakwal, Pakistan. The plants and pit water were inoculated with a consortium of 10 different hydrocarbon-degrading bacteria. The application of floating treatment wetlands to the pit reduced chemical oxygen demand, biochemical oxygen demand, total dissolved solids, hydrocarbon content, and heavy metals by 97.4%, 98.9%, 82.4%, 99.1%, and 80%, respectively, in 18 months. All plants survived and showed growth, but maximum development and biomass production were exhibited by *P. australis*. The bacteria used for inoculation were able to persist and show degradation activity in the water as well as in the rhizoplane, roots, and shoots of the plants. <https://www.nature.com/articles/s41545-018-0025-7.pdf>

ZERO VALENT ZINC - A NOVEL REMEDIATION TECHNOLOGIES FOR THE EMERGING CONTAMINANT 1,2,3-TRICHLOROPROPANE

O'Hara, S., E. Suchomel, and R. Deeb.

2019 Real Property Institute of Canada (RPIC) Federal Contaminated Sites Regional Workshop, 4-5 June, Halifax, Nova Scotia, 33 slides, 2019

An innovative treatment process using ISCR with zero-valent zinc (ZVZ) was lab and field-tested to degrade 1,2,3-trichloropropane (TCP). The presentation summarizes results from lab tests, small-scale pilot and field-scale pilot studies, and performance monitoring designed to collect data to demonstrate and validate the use of ZVZ to promote abiotic ISCR of TCP in groundwater. Data is being collected to develop performance metrics evaluating ZVZ delivery and treatment efficacy, engineering design, regulatory approval, and cost-benefit analysis. http://rpic-ifric.ca/images/2019_FCSRWP/presentations/Zero_Valent_Zinc_-_A_Novel_Remediation_Technologies_for_the_Emerging_Contaminant_123-Trichloropropane.pdf

APPLICATION OF MOLECULAR BIOLOGICAL TOOLS FOR MONITORING EFFICIENCY OF TRICHLOROETHYLENE REMEDIATION

Wu, Y.-J., P.-W. G. Liu, Y.-S. Hsu, L.-M. Whang, T.-F.-Lin, W.-N. Hung, and K.-C. Cho. Chemosphere 233:697-704(2019)

Five pilot-scale wells were constructed to monitor TCE remediation activities in contaminated groundwater, measure the bacterial concentrations and activity after EOS® injections, and correlate biological and gene concentration with TCE degradation. TCE was degraded 42-93% by the end of 175 days due to both EOS® injections and dilution of the aquifer movement among injection and monitoring wells. A *Dehalococcoides* sp. concentration of 108 copies/L caused the initial 40% degradation of TCE in groundwater. The well with optimal TCE degradation measured 109 cells/L of the *tceA* gene and had the highest Shannon index number. *Desulfotomobium desulfuricans* and *Desulfuromonas chloroethenica* were measured to be the predominant species within the groundwater post-injection. A variety of different factors, including well locations, geochemical indicators, and microbial contribution, were useful to explain the site-specific optimal TCE remediation approach.

THE IN SITU TREATMENT OF BTEX, MTBE, AND TBA IN SALINE GROUNDWATER

McGregor, R. and F. Vakili. Remediation 29(4):107-116(2019)

A 700-day pilot test was carried out in a saline unconfined petroleum hydrocarbon (PHC)-impacted aquifer to evaluate the performance of an engineered, combined remedy employing in situ chemical oxidation (ISCO) enhanced bioremediation (EBR) in a sequence. The PHC plume contained BTEX, MTBE, and TBA concentrations of $\leq 4, 584, 55, 182,$ and $1,860$ $\mu\text{g/L}$, respectively. A 13,826-L solution of unactivated sodium persulfate ($\text{Na}_2\text{S}_2\text{O}_8$, 19.4 wt%) was injected into a series of wells installed within the PHC plume. Persulfate injection resulted in mean total concentration decreases for BTEX ($\leq 91\%$), MTBE ($\leq 39\%$), and TBA (58%) over the first 50 days post-injection. Between days 51 and 487, BTEX concentrations decreased an additional 84% and MTBE an additional 33% due to EBR, noted by the lack of persulfate measured in the plume. TBA first decreased initially but increased as the sulfate concentration decreased from MTBE degradation. Isotope analyses of dissolved sulfate (^{34}S and ^{18}O), and compound-specific isotope analysis of benzene and MTBE (^{13}C and ^2H) showed that ISCO and EBR processes occurred at different stages and locations within the plume over time.

Research

DEVELOPMENT AND OPTIMIZATION OF ANALYTICAL METHODS FOR SIMULTANEOUS DETERMINATION OF IM AND LEGACY EXPLOSIVE COMPOUNDS

Crouch, R.A., J.C. Smith, B.S. Stromer, C.T. Hubley, S. Beal, G.R. Lotufo, A.D. Butler, et al. SERDP Project ER-2722, 99 pp, 2019

High-performance liquid chromatography (HPLC) methods to extract, pre-concentrate, and analytically separate and quantify 24 legacy and insensitive munition (IM) compounds were developed as a single, standardized method for simultaneous analysis in environmental matrices. The solid-phase extraction method was tested on 5 water sources, including river, sea, and groundwater. A 2-step solvent extraction method was developed and tested on 5 field soils. Recoveries of all 24 compounds of interest for all soils were within quality systems manual (QSM) limits. A single 18-h solvent extraction method was developed for soil-dwelling invertebrate, freshwater vertebrate, marine invertebrate, and perennial plant tissues. For most tissues, ≥ 20 compounds of interest were recovered within current QSM limits. In order to address observed analytical interferences, a post-extraction preparative chromatographic method was developed to improve recoveries of several compounds in tissues, including nitroguanidine and 3-nitro-1,2,4-triazolo-5-one. New HPLC methods reduced total analytical run time by $\sim 25\%$ versus the use of separate legacy and IM methods and could reduce labor and supply costs by 50%. <https://www.serdp-estcp.org/content/download/49779/490495/file/ER-2722%20Final%20Report.pdf>

EFFECTIVENESS OF BIOCHAR OBTAINED FROM CORNCOB FOR IMMOBILIZATION OF LEAD IN CONTAMINATED SOIL

Rodriguez, A., D. Lemos, Y. Trujillo, J.G. Amaya, and L.D. Ramos. Journal of Health & Pollution 9:23(2019)

Biochar produced from corncob was used as an amendment in soils containing 167.62 g/kg of Pb extracted from the Malambo municipality, Colombia. Unmodified biochar was compared to biochar treated with 10% hydrogen peroxide. Unmodified biochar immobilized $\leq 61.46\%$ of lead, while modified biochar obtained only 44.53% retention. A pot experiment was done on both biochars using *Pennisetum claudetinum* seed for 33 days to compare plant growth in different biochar concentrations in soil. Modified biochar indicated high germination and growth of seeds ($\leq 89.8\%$). Although the lead immobilization in soil was positive for both cases, further studies are recommended using soil with lower lead concentration levels. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6711329/pdf/2156-9614-9-23-190907.pdf>

A POTENTIAL NOVEL APPROACH FOR IN SITU CHEMICAL OXIDATION BASED ON THE COMBINATION OF PERSULFATE AND DITHIONITE

Liu, Y., Y. Zhang, and A. Zhou. Science of the Total Environment 693:133635(2019)

A novel combined process that coupled persulfate (PS) and dithionite was tested as a remediation technique for organic contamination, represented in this study by TCE. PS/dithionite was effective but depended on operating parameters, including initial PS and dithionite dosages. The optimal molar ratio of PS/dithionite/TCE was 5/5/1. Sulfate radicals ($\text{SO}_4^{\cdot-}$) were the dominant reactive species responsible for TCE degradation in the PS/dithionite system, which increased in the presence of oxygen but was still effective in an anaerobic environment.

ELECTROKINETIC REMEDIATION OF PB NEAR THE E-WASTE DISMANTLE SITE WITH $\text{Fe}(\text{NO}_3)_3$ AS CATHODE ELECTROLYTE

Zhang, Z., W. Ren, J. Zhang, and Fang Zhu. Environmental Technology [Published online 4 Aug 2019 prior to print]

This study tested the capabilities of activated carbon fiber (ACF) enhanced electrokinetic technology to remediate Pb-contaminated soil in an e-waste dismantle site. Experiments were conducted using $\text{Fe}(\text{NO}_3)_3$ as catholyte and citric acid-sodium citrate as anolyte under varying conditions of pH value of anolyte, voltage, and the electrode gap. Simultaneously, a group of contrast tests without ACF were set up to investigate the adsorption performance of ACF for Pb. The highest removal rate of Pb after remediation was 80.53% at 4 cm from the anode when the electrode gap was 31 cm, pH value was 3, and the voltage was 28 V, and the total removal rate increased significantly with the decrease of the pH value of anolyte and the increase of voltage. Characterization of ACF after reaction showed that ACF effectively adsorbed heavy metal Pb at 1.42 mg/g. Sequential extraction analysis revealed that Pb mainly existed bound to organic matter and in the residual form in the soil after remediation.

GRANULATED BOG IRON ORES AS SORBENTS IN PASSIVE (BIO)REMEDIATION SYSTEMS FOR ARSENIC REMOVAL

Debiec, K., G. Rzepa, T. Bajda, W. Uhrzynowski, A. Skłodowska, J. Krzysztoforski, et al. Frontiers in Environmental Chemistry 6:54(2018)

This study (i) investigated the ability of granulated bog iron ores (gBIOs) to remove arsenic from various types of contaminated waters, and (ii) estimated the application potential of gBIOs in technologies dedicated to water treatment. Studies conducted on synthetic solutions of arsenic and environmental samples of As-contaminated water showed gBIOs as an appropriate As and Zn adsorbent, confirmed by dynamic adsorption studies. The actual sorption efficiency of gBIOs depended on the adsorbate concentration. Desorption analysis showed that As-loaded gBIOs are characterized by high chemical stability and they may be reused for the (ad)sorption of other elements. The effective removal of inorganic As suggests that gBIOs might be used for remediation of both highly oxygenated waters and groundwater or settling ponds, where the oxygen level is low. Arsenic concentration after treatment was This article is **Open Access** at <https://www.frontiersin.org/articles/10.3389/fchem.2018.00054/full>

CATALYTIC REDUCTION OF HEXAVALENT CHROMIUM USING IRON/PALLADIUM BIMETALLIC NANOPARTICLE-ASSEMBLED FILTER PAPER

Shi, D., Z. Ouyang, Y. Zhao, J. Xiong, and X. Shi. Nanomaterials 9:1183(2019)

Iron/palladium bimetallic nanoparticles (Fe/Pd NPs) were assembled on a filter paper substrate and used for the catalytic conversion of Cr(VI) to Cr(III). The prepared filter paper assembled with Fe/Pd NPs had a mean diameter of 10.1 nm and was characterized by various techniques. This assembly demonstrated powerful catalytic activity to transform Cr(VI) to Cr(III) at low cost. This article is **Open Access** at <https://www.mdpi.com/2079-4991/9/8/1183>

REMEDICATION OF SOIL POLLUTED BY ORGANIC COMPOUNDS THROUGH CHEMICAL OXIDATION AND PHYTOREMEDIATION COMBINED WITH DCT

Rada, E.C., G. Andreottola, I.A. Istrate, P. Viotti, F. Conti, and E.R. Magaril. International Journal of Environmental Research and Public Health 16: 3179(2019)

An experimental application compared three methods for remediation of contaminated sites to soils from a former industrial area polluted with organic compounds. Electroremediation and combined phyto-electrochemical and electrooxidation treatment were applied to nine soil samples collected at two depths (0.2 and 0.4 m). The electrochemical treatment and electrooxidation had an efficiency of 20% while the two combined methods had efficiencies of 42.5% for electrooxidation (with H_2O_2) and 20% for phyto-electroremediation with poiselettias. This article is **Open Access** at <https://www.mdpi.com/1660-4601/16/17/3179>

ELECTRODIALYTIC PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) REMOVAL MECHANISM FOR CONTAMINATED SOIL

Sorengard, M., G. Niarchos, P.E. Jensen, and L. Ahrens.
Chemosphere 232:224-231(2019)

An electro-dialytic remediation method was tested in a lab-scale experiment over 21 days on PFAS-contaminated soil from a fire-fighter training site at Stockholm Arlanda Airport, Sweden. Of 23 PFASs targeted, electromigration towards the anode was observed for C₃-C₇ PFCAs and C₄, C₆, and C₈ PFASs. In contrast, MeFOSA, FOSAA, and EtFOSAA transported towards the cathode. Mass balance calculations determined that ≤20% of the shortest-chained PFASs were extracted from the soil to the anolyte.

PILOT-SCALE ELECTRO-KINETIC REMEDIATION OF LEAD POLLUTED FIELD SEDIMENTS: MODEL DESIGNATION, NUMERICAL SIMULATION, AND FEASIBILITY EVALUATION

Mao, X., X. Shao, and Z. Zhang.
Environmental Sciences Europe 31:25(2019)

Model simulation and feasibility analysis were used to optimize the pilot-scale remediation and recycling of Pb-polluted sediments using electro-kinetic remediation (EKR). A 2D reactive-transport model was designed and implemented to fully describe the transport mechanisms and geochemical reactions of Pb in sediments, focusing on the assumptions of model parameters for better construction of the real contaminated sediment environment. The timing and duration of electrode polarity inversion (EPI) were optimized based on the simulation results of pH profiles, Pb mobilizations and distributions, and Pb removal efficiencies. The accuracies of the predicted results were then validated through a comparison with the experimental data of the pilot-scale EKR tests. Subsequently, a parametric study was performed to analyze the energy consumption of EKR with optimal operating parameters. A feasibility analysis determined that the method has low energy consumption and is a cost-effective remediation technique. <https://link.springer.com/content/pdf/10.1186%2Fs12302-019-0209-x.pdf>

General News

GUIDELINE ON PERFORMING REMEDIATION OPTIONS ASSESSMENT

CRC Care National Remediation Framework, 26 pp, 2018

This guide is intended to help conduct a preliminary remediation options appraisal at sites in Australia and identify remediation technologies to potentially treat the contaminants of concern or break identified pollutant linkages at the site under investigation. It also provides advice on formulating a remediation action plan. https://www.crcrcare.com/files/dmfile/GuidelineonconductingROA_Rev2.pdf

ABSTRACT BOOK: SOCIETY OF ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY NORTH AMERICA FOCUSED TOPIC MEETING

SETAC, 12-15 August, Durham, NC, 56 pp, 2019

This book comprises the abstracts for the platform and poster presentations of the Society of Environmental Toxicology and Chemistry (SETAC) North America Focused Topic Meeting entitled "Environmental Risk Assessment of Per- and Polyfluoroalkyl Substances (PFAS)". <https://pfas.setac.org/wp-content/uploads/2019/06/FINAL-PFAS-abstract-book-v2.pdf>

THE USE OF ADVANCED MOLECULAR BIOLOGICAL TOOLS IN GROUNDWATER CONTAMINATED WITH CHLORINATED SOLVENTS

Cupples, A., M. Michalsen, and K. Kucharzyk.
SERDP & ESTCP Webinar Series, Webinar #97, September 2019

SERDP and ESTCP sponsored two presentations on projects that aimed to measure biomarkers as a mechanism to monitor reductive dechlorination in groundwater contaminated with chlorinated solvents. The first presentation discusses two alternative methods to quantitative PCR-loop mediated isothermal amplification and shotgun sequencing with both taxonomic and functional analyses to measure *Dehalococcoides mccartyi* genes in groundwater samples that encode for distinct reductive dehalogenases. The second presentation discusses a method to quantify *Dehalococcoides* reductive dehalogenase proteins as a measure of reductive dechlorination and correlates their abundance with in situ reductive dechlorination rates. <https://www.serdp-estcp.org/Tools-and-Training/Webinar-Series/09-05-2019>

PERSULFATE-BASED ADVANCED OXIDATION PROCESSES (AOPS) FOR ORGANIC-CONTAMINATED SOIL REMEDIATION: A REVIEW

Zhou, Z., X. Liu, K. Sun, C. Lin, J. Ma, M. He, and W. Ouyang.
Chemical Engineering Journal 372:836-851(2019)

An overview of persulfate-based AOPs for organic-contaminated soil remediation is presented in this publication, focusing on activation mechanisms and influential factors.

THE OVERLOOKED SHORT- AND ULTRASHORT-CHAIN POLY- AND PERFLUORINATED SUBSTANCES: A REVIEW

Ateia, M., A. Maroli, N. Tharayil, and T. Karanfil.
Chemosphere 220:866-882(2019)

Peer-reviewed studies on the analytical methods, occurrence, mobility, and treatment for ultra-short-chain PFAS (C=2-3) and short-chain PFAS (C=4-7) are reviewed in this publication. Previous studies frequently detected ultra-short-chain and short-chain PFAS in various types of aqueous environments, including seas, oceans, rivers, surface/urban runoffs, drinking waters, groundwaters, rain/snow, and deep polar seas. Recent regulations and restrictions on the use of long-chain PFAS have resulted in a significant shift in the industry toward short-chain alternatives. Understanding of the environmental fate and remediation of these ultra-short-chain and short-chain PFAS is still fragmentary. This publication covers studies involving the removal of ultra-short and short-chain PFAS and identifies future research needs.

HEAVY METAL POLLUTIONS: STATE OF THE ART AND INNOVATION IN PHYTOREMEDIATION

DalCorso, G., E. Fasani, A. Manara, G. Visioli, and A. Furini.
International Journal of Molecular Sciences 20:3412(2019)

Phytoremediation is the subject of this review, focusing on its use to remediate heavy metals in soils. The main aspects and innovations in this field are considered with respect to the selection of efficient plant genotypes, the application of improved cultural strategies, and symbiotic interaction with soil microorganisms to manage heavy metal polluted soils. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6679171/pdf/ijms-20-03412.pdf>

BIOAUGMENTATION AND BIOSTIMULATION: A POTENTIAL STRATEGY FOR ENVIRONMENTAL REMEDIATION

Goswami, M., P. Chakraborty, K. Mukherjee, G. Mitra, P. Bhattacharyya, S. Dey, et al.
Journal of Microbiology & Experimentation 6(5):223-231(2018)

This review extensively focuses on a comparative discussion on different strategies of bioremediation to remediate the environment from toxic, hazardous waste to build a less-toxic, stable and healthy environment. <https://pdfs.semanticscholar.org/571c/674f8c62bc1fa8690c5c06284e81e73f3502.pdf>

1,4-DIOXANE: EMERGING TECHNOLOGIES FOR AN EMERGING CONTAMINANT

Broughton, A., A. Sepulveda, K. Foster, T. Kruk, M.G. Nickelsen, M. Gillan, and T.K.G. Mohr
Remediation [Published online 11 Sept 2019 prior to print]

Federal and state-by-state 1,4-dioxane-specific drinking water and groundwater concentration criteria are summarized in this publication. In addition, the effectiveness of conventional and alternative treatment technologies are compared. The article includes a case study of a site in California where an alternative treatment technology is being utilized to remediate 1,4-dioxane-contaminated groundwater.

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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