Entries for February 1-15, 2020

Market/Commercialization Information

$176.2M SMALL BUSINESS PREPLACED REMEDIAL ACTION CONTRACT MATOC UNDER THE MEGA FOR OMAHA DISTRICT, NORTHERN DIVISION
U.S. Army Corps of Engineers (USE), 2071, Omaha, NE.
Contract Opportunities on Betasam.gov, Solicitation W9128F20R0038, 2020
This procurement is a small business set-aside (NAICS code 562910) as a part of the USACE Multiple Environmental Government Acquisition (MEGA) strategy. This solicitation has a target of 10 IDIQ contract awards within a maximum shared capacity of $176.2M. Projects will include Installation Restoration Program activities on active Army, Navy, and Air Force installations and on formerly used defense sites for services related to requirements for RCRA, CERCLA, EPA’s Emerging Contaminants Program, the NCP, and the MMP. Proposals are due by 2:00 PM CT on April 3, 2020.
https://beta.sam.gov/opp/5866f87a4f5af9206d4d5f2d9297/view

MULTIPLE ENVIRONMENTAL GOVERNMENTAL ACQUISITION (MEGA)
U.S. Army Corps of Engineers (USE) W071, St. Louis, MO.
Contract Opportunities on Betasam.gov, Solicitation W91292000002, 2020
This solicitation is a 100% small business set-aside for an IDIQ contract with a basic ordering period of three years plus one 2-year option period under NAICS code 562910 (Remediation Services), size standard 750 employees. The USE St. Louis District intends to award five contracts from this solicitation under its MEGA strategy, shared contract capacity not to exceed $88.125M. The work will require personnel, plant, and equipment to respond to numerous USES requests for environmental support. This Pre-Positioned Remedial Action Contract will primarily support work assigned to the USACE Mississippi Valley Division, St. Louis District, with the majority of the work potentially conducted to support projects for U.S. EPA Regions 5 and 7. Offers are due by 2:00 PM CT on April 6, 2020.
https://beta.sam.gov/opp/c0eb33de951147cb4833f4e56d9ec06/view

SAFE HOME INITIATIVE
U.S. Coast Guard Base Kodiak (00045), AK.
Contract Opportunities on Betasam.gov, 2020
These requirements are total small business set-asides, NAICS code 541620 (Environmental Consulting Services). The U.S. Coast Guard requires contractor services in Alaska to conduct a high risk assessment in accordance with EPA and HUD guidelines for asbestos-containing materials (ACM), lead-based paint (LBP), lead dust, and radon.
https://beta.sam.gov/opp/6345f9b153f3e7392cdd9b5a1543d/view

BEALE AFB OPTIMIZED REMEDIATION CONTRACT (ORC)
U.S. Army Engineer District, Sacramento, CA.
Contract Opportunities on Betasam.gov, Solicitation W9123820R0002, 2020
This acquisition of an ORC for Beale AFB, CA, is issued as a total small business set-aside, NAICS code 562910. The range of activities necessary to conduct environmental remediation activities at Beale AFB includes maintenance of established program at applicable sites, and achievement of site-specific objectives as identified in the contract. During the 10-year period of performance, Contractor shall undertake environmental remediation activities to achieve performance goals under the 12 Installation Restoration Program Sites.
https://beta.sam.gov/opp/63288fae65e744d9c9/view

GROUNDWATER RDIRA, D.Q. UNIVERSITY FUDS ID J09CA1180, YOLO COUNTY, CA
U.S. District Sacramento, CA.
Contract Opportunities on Betasam.gov, Solicitation W9123820M0030, 2020
This acquisition is a 100% small business set-aside with no sub-socioeconomic category set-aside, NAICS code 562910. Award of this action is expected to be awarded to a qualified firm.
https://beta.sam.gov/opp/7665c99c6348a9f165656c25d1f94d/view

COBRAT TRAINING OPERATIONS AND SUPPORT SERVICES
FEMA, Acquisition Operations Division/Preparedness Section, Washington, DC.
Contract Opportunities on Betasam.gov, Solicitation 70FAA020M0004, 2020
The Government intends to award a firm-fixed price/cost-reimbursement hybrid contract as a total small business set-aside for training operations and support services for FEMA’s Center for Domestic Preparedness (CDP). The CDP national training facility prepares emergency response personnel to respond to all hazards, including terrorist attacks using weapons of mass destruction, by providing advanced, hands-on training to state, local, tribal, federal, private sector, and non-governmental organizations. The intent of this contract is to provide required training needed to meet the mission of the 12 Installation Restoration Program Sites.
https://beta.sam.gov/opp/83f65c8092e634a8a9f165656c25d1f94d/view

Cleanup News

IN SITU TREATMENT OF A DILUTE CHLORINATED SOLVENT PLUME IN AN ACIDIC AEROBIC AQUIFER
In situ bioremediation was selected to remediate a 29-acre dilute, acidic and aerobic, chlorinated solvent plume (mainly TCE and 1,1-DCE) at the Monitor Devices Inc./Intercircuits Inc. Superfund site in New Jersey. Full-scale operation of the reductive dechlorination and bioaugmentation began in late 2010, and treatment continued steadily over 9 years. The amendments injected included electron donor and bicarbonate buffer solution and, once anaerobic aquifer conditions became established, a bioaugmentation culture. Amendments were injected in multilevel injection wells (IW), to maintain control over the vertical interval of amendment delivery. The areal coverage of the plume has been reduced by 59% based on the 10 µg/L TCE isocontour and the contaminant mass has been reduced by 79%. Lessons learned from this project include the need for bioaugmentation in the acidic aquifer and an efficient and effective manner of transport.
https://beta.sam.gov/opp/70fa5c4909b247ed46c5f46d1c98ad/view

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These requirements are total small business set-asides, NAICS code 541620 (Environmental Consulting Services). The U.S. Coast Guard requires contractor services in Alaska to conduct a high risk assessment in accordance with EPA and HUD guidelines for asbestos-containing materials (ACM), lead-based paint (LBP), lead dust, and radon.
https://beta.sam.gov/opp/6345f9b153f3e7392cdd9b5a1543d/view

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https://beta.sam.gov/opp/63288fae65e744d9c9/view

GROUNDWATER RDIRA, D.Q. UNIVERSITY FUDS ID J09CA1180, YOLO COUNTY, CA
U.S. District Sacramento, CA.
Contract Opportunities on Betasam.gov, Solicitation W9123820M0030, 2020
This acquisition is a 100% small business set-aside with no sub-socioeconomic category set-aside, NAICS code 562910. Award of this action is expected to be awarded to a qualified firm.
https://beta.sam.gov/opp/7665c99c6348a9f165656c25d1f94d/view

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https://beta.sam.gov/opp/83f65c8092e634a8a9f165656c25d1f94d/view
TRANSPORTING AN OIL FIELD WASTE DISPOSAL FACILITY INTO RESIDENCES AND HABITAT - NORTH SHORE AT MANDALAY BAY

Schuetz, M. | 2nd Annual Western Groundwater Conference, 17-19 September, Sacramento, CA, 36 slides, 2019

Previous activities at the 90.26-acre former waste disposal facility contaminated soil and groundwater with VOC, SVOC, total petroleum hydrocarbons, heavy metals, and PAH. After extensive remedial action planning, sampling in 2015 showed low concentrations of VOCs remained in soil gas and groundwater in limited subarea locations where residential housing redevelopment was planned, posing a potential vapor intrusion risk. To mitigate the soil contamination, a 41-well soil vapor extraction (SVE) system was installed in two areas of the site. Within 18 months of operation, steady-state, diffusion-limited removal of VOCs was achieved. The remediation resulted in an 85% reduction of VOC concentrations. Subsurface materials were injected into groundwater, which accelerated natural attenuation to reduce residual VOC. Long-term groundwater monitoring is planned, and SVE monitoring will continue for >2 years after the system is shut down. The work includes three phases: 1) remediation design options and a remote monitoring system for each proposed residential area to address the potential soil vapor indoor air pathway. [https://www.grac.org/media/files/s1814ec6/19-2-Z-c-melissa-schuetz.pdf] For more information, including site documents on the SVE system, see:


NOVEL SHORELINE CAP FOR CONTROLLING SHEEN AND DISSOLVED-PHASE CONSTITUENT DISCHARGE


Releases of petroleum LNAPL related to upland impacts caused occasional sheens on a portion of the Willamette River in the Portland Harbor Superfund site, OR. The frequency and volume of sheens decreased following the installation of an upland sheet pile barrier wall, but occasional sheens related to LNAPL stationary on the bottom of the wall continued. To mitigate the LNAPL, and dissolved-phase groundwater constituent sheen, a novel, multilayered shoreline cap was designed and installed. The cap was designed to mitigate sheen and to meet the objectives specified in the Portland Harbor Record of Decision including limiting the discharge of certain dissolved-phase constituents of interest. The cap design was the first instance of combining an oleophobic bio-barrier to mitigate sheen and an activated carbon layer to capture dissolved-phase constituents. No sheen has been visually observed since cap installation. More information [https://www.deq.state.or.us/WebDocs/Controls/Output/PdfHandler.aspx?p=0da00bf6-4778-45a9-a491-b2b62be3aepdf]

Demonstrations / Feasibility Studies

ETHYLENE DIBROMIDE IN SITE BIODEGRADATION PILOT TEST REPORT BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111, KIRKLAND AIR FORCE BASE, NEW U.S.

S. Lee, A. Corp of Engineers Omaha District, 247 pp, 2019

A pilot test was conducted at Units ST-106 and SS-111 to investigate potential treatment amendments for anaerobic in situ bioremediation of ethylene dibromide (EDB) at the Bulk Fuels Facility on Kirtland AFB. Using one injection and groundwater circulating, two extraction, and six monitoring wells and the pilot test evaluated baseline conditions followed by biostimulation in the subsurface after distribution of treatment amendments in recirculated groundwater; biotreatment up to long-term monitoring periods ranging from 30.5-432 µg/L in shallow wells; virtually no EDB was detected in intermediate wells suggesting biologically active subsurface. At the pilot conclusion, EDB reductions were >97% in the shallow wells; four wells exhibited a two log reduction while the remaining two wells had <0.1 µg/L EDB at 12 months. The EDB degradation was evident through a decrease in total VOC, toluene concentrations, and the production of EDB degradation products ethene, ethane, and bromide suggested that the degradation occurred by reductive dehalogenation. [https://www.envt.nm.gov/wp-content/uploads/2019/04/KAFF-in-situ-biodegradation-report-April-2019.pdf]

BOREHOLE-SCALE TESTING OF MATRIX DIFFUSION FOR CONTAMINATED-ROCK AQUIFERS


A newly developed method assesses the effect of matrix diffusion on contaminant transport and remediation of groundwater in fractured rock. The method uses borehole monitoring wells in fractured rock to conduct backward diffusion experiments on CVOCs in groundwater. Testing was performed on relatively unfractured zones over short time intervals in open boreholes at the former Pease Air Force Base in Portsmouth, New Hampshire to investigate back diffusion of cis-1,2-DCE. Post-sparging concentrations of cis-1,2-DCE showed initial rebounding followed by declines, excluding an episodic spike in concentrations from a groundwater recharge event. Three processes were theorized to control concentration responses in the test zones: post-sparging: 1) the limited back diffusion of CVOCs from a halo or thin zone around the borehole contributes to the initial rebubbling; 2) aerobic degradation of cis-1,2-DCE occurred in causing concentrations in the test zone; and 3) microflow from microfractures contributed to the episodic spike in concentrations following the groundwater recharge event. In active flow zones, the latter two processes are not measurable due to equilibration from groundwater transport between the borehole and active flowing fractures.

PILOT-Scale ELECTRO-BIOREMEDIATION OF HEAVILY PAH-CONTAMINATED SOIL FROM AN ABANDONED COOKING PLANT SITE


A 182-day pilot study was conducted at Shenyang former Cooking Plant in China to remove PAHs (total PAHs of 5,635.6 mg/kg) from the soil using three treatments: control treatment (without inoculation or electric field), bioremediation with inoculation, and electro-bioremediation with inoculation and electric field. Treatments were conducted from May to October under natural conditions. Results show that electro-bioremediation enhanced the removal of PAHs, especially high-ring (>2 rings) PAHs. At 182 days, the degradation extents of total PAH reached 69.1% and 4-6 ring PAHs reached 65.9% (29.3% and 44.4% higher, respectively, than those under bioremediation alone). After electro-bioremediation, the total toxicity equivalent concentrations also were reduced. Electro-bioremediation effectively reduced the risk of soil at the site. Also, electro-bioremediation with polarity reversal could maintain uniform soil pH, the degradation extent of PAHs, and soil microorganism numbers at all sites. The environmental conditions, such as temperature and rainfall, had little influence on the process of electro-bioremediation.

FIELD-SCALE BIOREMEDIATION OF ARSENIC-CONTAMINATED GROUNDWATER USING SULFATE-REDUCING BACTERIA AND BIOGENIC PYRITE


Biogenic pyrite formed by stimulating indigenous sulfate-reducing bacteria (SRB) in a natural aquifer removed dissolved arsenic from contaminated under strongly reducing conditions. Biodegradable organic carbon, ferrous iron, sulfate, and fertilizer were injected into groundwater to stimulate SRB metabolism, which began ~1 week later. Microscopic, X-ray diffraction, and electron microprobe analyses confirm the bio-mineralization of pyrite and over time, pyrite nanoparticles grew to form well-formed crystals (1-10 µm in diameter) or spherical aggregates that contain 0.05-0.4 w% arsenic. Dissolved arsenic decreased from 0.3-0.5 mg/L to 90% and lasted for 6 months until the upgradient groundwater mixed with the aquifer. Groundwater with the most active bacterial sulfate reduction became enriched in S 34S (2.02-4.00‰) compared to unaffected water (0.40-0.61‰). One to three orders of magnitude decreases in SRB cells were observed in treated wells for at least 2 months after injection. For full-scale remediation, the injection of the solution should start at positions hydrologically upgradient from the major plume and proceed downstream. If needed, aquifers may be repeatedly amended with biodegradable organic carbon to reestablish the reducing conditions that favor arsenic sequestration.
This article introduces three cutting-edge methods for water remediation: nanofibrous membrane, biofiltration, and electrodialysis. Advantages and applications of these new technologies are highlighted. Combined remediation technologies have attracted widespread attention for their unique advantages to remediate heavy metals in sediments. This article reviews recent progress and recommendations are discussed.

The microbial fuel cell (MFC) system, a promising environmental remediation technology, has a simple compact design, low cost, and converts chemical energy from waste matter to electrical energy. In this review, research was gathered on the use of MFC system technologies for pollutant removal and environmental remediation. The review includes an introduction of the main configurations and pollutant removal mechanism by MFCs; research progress of MFC systems, from waste matter to electrical energy. In this review, research was gathered on the use of MFC system technologies for pollutant removal and environmental remediation. The review includes an introduction of the main configurations and pollutant removal mechanism by MFCs; research progress of MFC systems, from waste matter to electrical energy.

A double dielectric barrier discharge (DDBD) plasma reactor was optimized with influential parameters including applied voltage, type of carrier gas, air feeding rate, and ISS amendment CaO content. Combined treatment altered the soil physicochemical properties and significantly increased Ca and S contents. Activated persulfate-related reactions did not negatively impact unconfined compressive strength and hydraulic conductivity. This paper is Open Access at https://www.mdpi.com/1660-4601/15/11/2595/html.

Columns studies were performed to measure the transport and leaching of PFOS in unsaturated soils at a Norwegian former firefighting training facility 15 years after aqueous film-forming foam (AFFF) use had ceased. PFOS accounted for 96% of the total PFAS concentration in site soil with concentrations ranging from 0.04 to 0.849 mg O

This paper is Open Access at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6950138/pdf/ijerph-16-05098.pdf

Building on results demonstrating the efficacy of electron beam irradiation as a remediation technology, additional experiments and simulations were performed to prepare the technology for field application. These experiments focused on the development of soil handling systems and the optimization of treatment parameters. The present, the experimental setup, and results. https://cse.utlusa.edu/wp-content/uploads/2019/11/IPEC-2019-J-Lassalle-Remediation-Presentation.pdf

Remediation of Pyrene contaminated soil by double dielectric barrier discharge plasma technology: performance optimization and evaluation

A double dielectric barrier discharge (DDBD) plasma reactor was optimized with influential parameters including applied voltage, type of carrier gas, air feeding rate and initial pyrene concentrations in contaminated soil. Input energy was found to have a great effect on pyrene remediation efficiency followed by pyrene initial concentration. The effect of air feeding rate was insignificant. The remediation efficiency of pyrene under air, nitrogen, and argon as carrier gas were approximately 79.7, 40.7 and 38.2% respectively. Pyrene remediation efficiency was favored at high levels of applied voltages and low levels of pyrene initial concentration (10 mg/kg) and air feeding rate (0.85 L/min). Computing the system's energy efficiency showed that an optimal applied voltage (35.8 kV) and high energy efficiency. A regression model predicting pyrene remediation under DDBD plasma condition was developed using the data from a face-centered central composite design experiment. A residual toxicity analysis depicted that the respiratory activity increased more than 21 times (from 0.04 to 0.849 mg O\textsuperscript{2}/g) with a pyrene remediation efficiency of 81.1%.

General News
Nanotechnology in Remediation of Water Contaminated by Poly- and Perfluoroalkyl Substances: A New Conceptual Framework

This project's primary objective was to evaluate whether magnetite and Fe-containing clay minerals reduced PCE and TCE alone and in the presence of ferrous iron (Fe(II)) or sulfur (S(II)). evaluate pathways and factors controlling abiotic degradation of PCE and TCE by reactive minerals, and evaluate which aquifer processes could be used as indicators for abiotic natural attenuation rates in anoxic PCE and TCE plumes. Magnetite and reduced Fe-containing clay minerals alone did not reduce PCE and TCE under anoxic conditions. No reduction of PCE and TCE were observed when sulfide was added to magnetite and clay mineral suspensions. However, Fe-containing clay minerals reduced PCE and TCE to acetylene in the presence of high concentrations of Fe(II). In both cases, analyses indicated a transient mineral phase formed suggesting that high Fe(II) concentrations that favor abiotic precipitation of magnetite could abiotically attenuate anoxic PCE and TCE plumes. https://www.serdp-estcp.org/content/download/50676/498031/file/ER-2532%20Final%20Report.pdf

Microbial Fuel Cell System: A Promising Technology for Pollutant Removal and Environmental Remediation

The microbial fuel cell (MFC) system, a promising environmental remediation technology, has a simple compact design, low cost, and converts chemical energy from waste matter to electrical energy. In this review, research was gathered on the use of MFC system technologies for pollutant removal and environmental remediation. The review includes an introduction of the main configurations and pollutant removal mechanism by MFCs; research progress of MFC systems, including wastewater treatment, soil remediation, natural water, and groundwater remediation, sludge and solid waste treatment, and greenhouse gas emission control. The role of MFCs in environmental monitoring; and the combination of MFCs with other technologies. Current limitations and potential future research recommendations are discussed.

Research on Progress in Combined Remediation Technologies of Heavy Metals Polluted Sediment

Combined remediation technologies have attracted widespread attention for their unique advantages to remediate heavy metals in sediments. This article introduces combined remediation technologies based on physical-, chemical-, and bio-remediation of heavy metal polluted sediments. It summarizes research progress in physical-chemical, bio-remediation, and inter-organism (including plants, animals, microorganisms) remediation of heavy metal polluted sediments. It also presents a discussion of the current status of combined remediation of heavy metals in river sediments and outlines the future development trends of remediation technologies. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5695138/pdf/jiphc-16-05098.pdf

The Application of Three New Technologies in Water Remediation: Taking Pearl River Delta as an Analysis Sample

This article introduces three cutting-edge methods for water remediation: nanofibrous membrane, biofiltration, and electrodialysis. Advantages and disadvantages are discussed and suggestions are given as how to apply the technologies to the Pearl River Delta in China, which is contaminated with industrial wastewater and living sewage. https://iopscience.iop.org/article/10.1088/1755-1315/330/3/032001/pdf

Theory and Modelling Approaches to Passive Sampling
This review describes passive sampling theory and modeling approaches presented in the literature in a manner that allows researchers to understand them and to recognize the assumptions behind each approach together with their applicability to a given passive sampling technique. The review also presents empirically calibrated models in an attempt to simplify the process of passive sampling rate determination.

BAMBOO - AN UNTAPPED PLANT RESOURCE FOR THE PHYTOREMEDIATION OF HEAVY METAL CONTAMINATED SOILS

Bian, F., Z. Zhong, X. Zhang, C. Yang, and X. Gai.
Chemosphere 246:125750(2020)

Although there are limited studies on bamboo for phytoremediation, recent studies have shown that some bamboo species have a high ability to adapt to metalliferous environments and a high capacity to absorb heavy metals. However, excessive concentrations of heavy metals may cause oxidative stress and damage bamboo plants. Several management strategies have been developed to improve bamboo’s phytoremediation ability, including selecting tolerant bamboo species, intercropping with hyperaccumulators, fertilization applications, and employment of chelate in soil. This review demonstrates that bamboo species, which have high biomass productivity, short rotation, and high economic value, can be used for phytoremediation. Mechanisms of heavy metal uptake, transport, sequestration, and detoxification of different bamboo species require further investigation.

MICROBIAL REMEDIATION APPROACHES FOR EXPLOSIVE CONTAMINATED SOIL: CRITICAL ASSESSMENT OF AVAILABLE TECHNOLOGIES, RECENT INNOVATIONS AND FUTURE PROSPECTS

Environmental Technology & Innovation 18:100721(2020)

This review critically assesses the various in situ and ex situ microbial treatment technologies to remediate explosive-contaminated soil, discusses the technologies’ environmental impact along with the various emerging trends in the field of microbial remediation in the past decade, and explores the prospects of microbial remediation that can provide a sustainable solution for soil explosive contamination.