Technology Innovation News Survey

Entries for April 1-15, 2020

Market/Commercialization Information

SUBAQUEOUS CAPPING TECHNICAL REVIEW, NEW BEDFORD HARBOR SUPERFUND SITE, NEW BEDFORD, MA
U.S. Army Engineer District New England, Concord, MA.
Contract Opportunities at Beta.SAM, Solicitation W912WJ20Q0082, 2020

This procurement is a total small business set-aside, NAICS code 541690, size standard $16.5M. The U.S. Army Corps of Engineers - New England District requires an independent subaqueous capping technical review for the New Bedford Harbor Superfund Site, New Bedford, MA. Offers are due by 2:00 PM ET on May 26, 2020. https://beta.sam.gov/opp/209344de1a6349b7801c2594b0a60b6e/view

GROUNDWATER MONITORING & INTERIM MEASURES REMEDIAL OPERATIONS, MAINTENANCE, AND MODIFICATIONS, KIRTLAND AIR FORCE BASE, NM
W075 U.S. Army Engineer District Albuquerque, NM.
Contract Opportunities at Beta.SAM, Solicitation W912PP20R0009, 2020

This procurement is a small business set-aside, NAICS code 562910, size standard 750 employees. The services are primarily to address groundwater contamination associated with historical releases from the Bulk Fuels Facility at Kirtland Air Force Base, Bernalillo County, New Mexico. Services include planning; permitting; regulatory compliance; collecting contaminant, geochemical, lithologic, hydraulic, and mechanical data; interpreting chemical data sets to make assessments of contaminant nature extent and degradation processes; using operational data to generate optimized system designs; operating remedial treatment system(s) and constructing system upgrades; and producing technical documents capable of withstanding scrutiny by subject matter experts. Contractor shall implement, monitor, and maintain interim measures in accordance with approved permits and contractor plans. Contractor shall perform remedial services, remedial construction, and environmental studies tasks at the Government's discretion and based upon the current site condition and need. Award will result in a firm-fixed-price service contract. Proposals are due by 2:00 PM MT on June 1, 2020.
Https://beta.sam.gov/opp/b3f1a17a2d904429a15317cc87f4ec82/view

R -- ENVIRONMENTAL SERVICES FOLLOW-ON
NASA Goddard Space Flight Center (GSFC), Greenbelt, MD.
Contract Opportunities at Beta.SAM, Solicitation 80GSFC20R0005, 2020

This competitive RFP is issued as an 8(a) set-aside for the Environmental Services follow-on contract (NAICS code 541620), which will provide services to meet Goddard Space Flight Center objectives in waste prevention and management, water management, air management, environmental program management, environmental planning and impact assessment, environmental liability management, and natural resources management, special studies, and investigation and work efforts. Performance will be at GSFC's Greenbelt campus, Wallops Flight Facility, and any NASA facility or location where NASA has management responsibility, oversight responsibility, or potential environmental responsibility. This competitive procurement will result in a hybrid cost-plus-fixed-fee (CPFF) core requirement and an IDIQ requirement with the ability to issue CPFF task orders. The contract will have a total potential ordering period of 5 years (a 1-year base and four 1-year options). An electronic library has been established at https://elibrary.gsfc.nasa.gov/ for this procurement. Offers are due by 2:30 PM ET on June 15, 2020. https://beta.sam.gov/opp/8d40c35bffc746c2a606f602e3331958/view

ENVIRONMENTAL REMEDIATION SERVICES FOR CLOSURE OF UNDERGROUND STORAGE TANKS (USTS), DEFENSE FUEL SUPPLY POINT (DFSP) MOFFETT FIELD
W075 Army Engineer District Los Angeles, CA.
Contract Opportunities at Beta.SAM, Solicitation W912PL20R0052, 2020

This procurement is issued as a total small business set-aside, NAICS code 562910. The USACE Los Angeles District intends to compete a new firm-fixed-price contract to permanently close five underground storage tanks and their appurtenances at DFSP Moffett Field, Moffett Federal Airfield, California. The range of activities includes sheet pile shoring, dewatering, removal, and disposal of five USTs to achieve regulatory closure. The resulting excavations are to be backfilled and compacted for future use. The estimated cost range is between $5M and $10M. Period of performance is anticipated to be 365 calendar days from the date of award. Proposals are due by 2:00 PM PT on June 19, 2020.
https://beta.sam.gov/opp/bdcd550e039d4615b924a7fa6b71f311/view

DEPARTMENT OF ENERGY OFFICE OF ENVIRONMENTAL MANAGEMENT SPECIAL NOTICE - PROCUREMENT SCHEDULE UPDATE
DOE EM-Environmental Management Consolidated Business Center, Cincinnati, OH.
Contract Opportunities at Beta.SAM, 2020

U.S. DOE is providing updated procurement schedule information on all major Office of Environmental Management final RFP releases under NAICS code 562910:
•Idaho Cleanup Project, no sooner than mid to late May 2020.
•Savannah River National Laboratory M&O Contract, June 2020.
•Carlsbad Technical Assistance Contract, June/July 2020.
•Nationwide Low-Level and Mixed Low-Level Waste Treatment Services, July 2020.
•Savannah River Site Integrated Mission Completion Contract, September 2020.
•Portsmouth Infrastructure Support Services Contract, October 2020.
•Oak Ridge Reservation Cleanup Contract, November 2020.
https://beta.sam.gov/opp/d16ebcc98796449d848c098124010e66/view

Cleanup News

QUARTERLY OPERATIONS REPORT THIRD QUARTER 2019 SOIL VAPOR EXTRACTION CONTAINMENT SYSTEM, SITE 1 FORMER DRUM MARSHALLING YARD NWIRP BETHPAGE, NY
Naval Facilities Engineering Command Mid-Atlantic, 73 pp, 2019

Wastes containing VOCs, SVOCs, PCBs, Cr, and Cd were disposed in drainage sumps, dry wells, and on the ground surface at Site 1 of the former the Naval Weapons Industrial Reserve Plant (NWIRP). The original remedy was an air sparging/soil vapor extraction system (SVE) that operated from 1997-2002 and removed >95% of VOCs in groundwater. A soil vapor investigation conducted in 2008 found TCE (250 &microg/m^3) and PCE (1,000 &microg/m^3) that exceeded state criteria at the eastern site boundary. An onsite SVE containment system (SVECS) was installed to capture the vapor and prevent further offsite migration. The SVECS has 12 SVE wells along the boundary, 18 soil vapor monitoring points, and soil vapor treatment consisting of a moisture separator, two SVE blowers, and a 5,000 lb vapor-phase granular activated carbon unit to remove VOCs from the offgas. The system runs 24 h/day, 7 days/week, except for maintenance and adjustment periods. Analytical results of vapor samples collected annually from these locations and the soil vapor pressure readings are used to further evaluate the SVECS operation and the potential for vapor intrusion. As of the third Quarter of 2019, total concentrations remain one to two orders of magnitude below baseline concentrations. https://www.navfac.navy.mil/niris/MID_ATLANTIC/BETHPAGE_NWIRP/N90845_002913.pdf
More information on the NWIRP site:
https://www.navfac.navy.mil/products_and_services/ev/products_and_services/env_restoration/installation_map/navfac_atlantic/midlant/nwirp_bethpage/site_descriptions/site1_former_drum_marshalling_area.html

APPLICATION OF CHEMICAL REAGENTS AS INNOVATIVE REMEDIATION TECHNOLOGIES FOR GROUNDWATER IMPACTED BY PETROLEUM HYDROCARBONS IN ITALY
Dal Santo, M. and G.A. Prosperi. | Italian Journal of Groundwater 419:63-71(2020)

Chemical reactants were injected to remediate 28 petroleum-hydrocarbon sites in Italy by enhanced bioremediation, in situ chemical oxidation, or surfactants. Soil and groundwater samples were collected from each site to identify the magnitude of the contamination and quantify the reagents needed. Reagents were either injected into monitoring wells, direct push points, or devoted injection wells or applied into filter socks or an excavation. Remediation efficacy was evaluated using contaminant chemical concentration and physicochemical parameters. Chemical injections led to a reduction of the contamination within one year from application for 62% of the sites. An increase in contaminant concentration was recorded at 10% of the sites, particularly where surfactants were used. This may be due to the desorption of the contamination after the application and a lack of groundwater recovery during pull activities. Pros and cons are listed for each method. https://www.acquesotterranee.net/index.php/acque/article/download/419/364

INVESTIGATIVE AREA 6 (IA-6) IRM PROGRESS REPORT ADDENDUM: APRIL/MAY & JULY 2019 GROUNDWATER SAMPLING FOR THE FORMER HOFFMANN-LA ROCHE INC. FACILITY, NUTLEY, NEW JERSEY
Hoffmann-La Roche Inc., 102 pp, 2020

This report presents 3- and 6-month post-injection results of enhanced in situ bioremediation (EISB) to remediate groundwater contaminated with PCE+ (PCE and its degradation products) at IA-6. ABC® electron donor; TSI DC® *Dehalococcoides ethenogenes* bioaugmentation culture; sodium ascorbate, sugar, and yeast to create anaerobic conditions; and pH buffer was injected into source area injection wells. Injection was combined with recirculation to facilitate the amendment transport and distribution within the treatment zone (taken from the *April 2019 Interim Remedial Measure Progress Report*). July 2019 sampling results indicated that concentrations of PCE and its degradation products were below the groundwater quality standards (GWQS) at eight of the 13 wells within the treatment zone. One or more of the target PCE+ constituent concentrations were above GWQS at the remaining five wells within the IRM treatment zone but were mostly only slightly above GWQS. The effectiveness of EISB for the remediation of PCE in groundwater throughout the targeted treatment area was demonstrated through multiple lines of evidence including biodegradation of PCE into daughter products to below GWQS, the presence of VC as the primary PCE degradation product, individual target constituent trends that showed evidence of biodegradation of PCE>daughter products>ethene and ethane, and the presence of anaerobic and reducing geochemical conditions necessary to support ongoing biodegradation. https://www.roche-nutley.com/content/dam/roche-nutley/en/documents/RocheNutley/IA6IRMProgRptMarch2020.pdf
The April 2019 Interim Remedial Measure Progress Report: https://www.roche-nutley.com/content/dam/roche-nutley/en/documents/RocheNutley/pdfs/gw_irm_apr_19/20190411_IA-6%20IRM%20Progress%20Report.pdf
To see updates for all IAs for the site, see https://www.roche-nutley.com/home/remediation-updates.html

Demonstrations / Feasibility Studies

PHASE 2 PILOT STUDY COMPLETION REPORT: SHELL POND REMEDIATION PILOT STUDY PROJECT, BAY POINT, CALIFORNIA
Pacific Gas and Electric Company, 75 pp, 2018

Shell Pond is a former 72-acre wastewater impoundment that contains a surficial layer of material contaminated with TPHs, PAHs, and metals. The year-long Phase 2 pilot study tested the viability and practicality of using phytoremediation and enhanced biodegradation as components of a combined remedy, including monitored natural attenuation, by assessing the potential for native plants to remediate contamination. The test also evaluated the effectiveness of the vegetative cover to prevent the release of dust and fugitive odors to the atmosphere. The pilot studies involved dewatering a 10-acre portion of the pond and installing an AquaDam ® to keep the remaining water out. Irrigated test plots were used to evaluate the influence of different native plants, compost, fertilizer, and gypsum on contaminant degradation and uptake. Other plots underwent mechanical soil aeration and amendment addition. The effectiveness of phytoremediation and enhanced biodegradation was assessed by statistically comparing analytical test results to determine if implementation of the pilot study impacted contaminant levels. Environmental challenges during the pilot study limited the availability of useful data. This report presents a summary of the activities conducted as part of the pilot study, the results of laboratory analyses, and the conclusions supported by those results.
https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/3205157220/SP_P2%20Completion%20Rpt_Text-Figs-Tables_FINAL_%2020190221.pdf
See poster from 2019 Battelle Sediments Conference for more information
https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/b3_-mnr-and-enhanced-mnr/b3_-98_poster_dyer.pdf?sfvrsn=eed0d7ae_2
To see all reports on the Shell Pond site, see https://www.envirostor.dtsc.ca.gov/public/profile_report?global_id=80001834

PFAS TREATMENT FOR MUNICIPAL WATER SUPPLY: STRATEGY AND PILOT TESTING TO RESTORE GROUNDWATER IN ORANGE COUNTY, CALIFORNIA
Plumlee, M., R. Medina, M. Pannu, J. Dadakis, S. Grieco, M. Hwang, A. Wille, and K. Dasu.
Groundwater Resources Association PFAS Week Virtual Conference, 27-29 April, 2020

The Orange County Water District (OCWD) has launched the nation's largest pilot program to test various treatment options for PFAS in groundwater and a planning study to help retailers evaluate how to quickly implement treatment. While the levels of PFOA and PFOS in Orange County groundwater wells are relatively low, OCWD is exploring long-term solutions to continue to meet all state and federal water quality standards. The pilots are being conducted in the Orange County Groundwater Basin, which provides 77% of the water supply for north and central Orange County. The pilot tests are evaluating granular activated carbon (GAC) filters (two 4-column skids with a 10-minute empty bed contact time [EBCT]), four ion exchange (IX) products with a 2-minute EBCT, and two novel adsorbents (polystyrene-based media with a 5-minute EBCT and modified zeolite media with a 2-minute EBCT). OCWD is also conducting laboratory-scale column testing of GAC and the novel adsorbents to use in conjunction with pilot test results to help predict full-scale product performance. OCWD is investing ~$1.4 million in the pilot and lab-scale testing.
https://www.grac.org/media/files/files/2e3f1362/presentation-meganplumlee.pdf *More information:*
https://www.ocwd.com/news-events/newsletter/2019/december-2019/ocwd-launches-nation-s-largest-pfas-pilot-program-to-id-local-removal-remedy/
See YouTube video on the pilot: https://www.youtube.com/watch?v=mVgYqxsfzjY&feature=youtu.be

ENHANCED REDUCTIVE DECHLORINATION OF TRICHLOROETHENE IN AN ACIDIC DNAPL IMPACTED AQUIFER
Borden R.C., S.D. Richardson, and A.A.Bodour.
Journal of Environmental Management 237:617-628(2019)

A pilot test used an emulsified vegetable oil (EVO) and colloidal magnesium hydroxide [$Mg(OH)_2$] formulation to enhance reductive dechlorination of TCE DNAPL in an acidic (pH≤4), heterogeneous aquifer. The test consisted of a single well injection to evaluate $Mg(OH)_2$ distribution and installation of two EVO- $Mg(OH)_2$ permeable reactive barriers (PRB-1 and PRB-2) at varying distances downgradient of the DNAPL source area. Distribution of $Mg(OH)_2$ was observed up to 2.3 m away from the injection point within a permeable coarse sand layer. $Mg(OH)_2$ transport in the overlying clayey-silty sand was minimal. Downgradient of the PRBs, colloidal $Mg(OH)_2$ increased the pH of the coarse sand to levels appropriate for biological reductive dechlorination (pH >~5). However, some settling of $Mg(OH)_2$ in the injection well generated persistent high pH (~9-10) within the PRBs. A redesigned suspension of colloidal $Mg(OH)_2$ was tested and proved to be more effective at raising aquifer pH without an excessive rise in pH within the PRBs. At PRB-1 (closest to the DNAPL source area), limited TCE biodegradation was observed due to the influx of high TCE concentrations (up to 400 mg/L) and inhibition of dechlorinating bacteria. At PRB-2 (25 m downgradient of the DNAPL source area), TCE concentrations were much lower (13-26 mg/L), and production of cDCE and some VC was observed. Subsequent bioaugmentation with a commercial dechlorinating culture at PRB-2 improved conversion of cDCE to VC and ethene at downgradient monitoring wells throughout the study. Results emphasized the importance of PRB location (relative to the DNAPL source), base selection for pH adjustment, source strength, and local heterogeneities for the design and long-term performance of ERD in acidic DNAPL-impacted aquifers.

Research

IN-SITU STABILIZATION OF PFAS CONTAMINATED SOILS AT TWO SUPERFUND SITES
Bless, D., J. McKernan, E. Barth, C. Acheson, M. Mills, M. Johnson, C. Su, D. Cutt, et al.
NEHA 2019 Annual Educational Conference & Exhibition, Nashville, 9-12, July, Nashville, Tennessee, 2019

The overall objective of this laboratory-scale research project was to identify a remediation approach using stabilizing agents capable of immobilizing PFAS in soil from two Superfund sites. The project evaluated both natural and commercially available stabilizing agents, and the potential development of a chemical formulation for a new stabilizing agent. The research involved three steps: 1) conduct laboratory isotherm/partitioning treatability study with up to four identified PFAS stabilizing agent formulations for two site-specific soils; 2) determine and document partitioning coefficients after treatment with the stabilizing agents to identify 'best performing' agents; and 3) conduct EPA's Synthetic Precipitation Leaching Procedure on the 'best performing' agents for the common compounds (PFOA, PFOS, PFBA, PFBS, PFNA, and PFHxS) with potential sorbents such as activated carbon, biochar, and commercial organoclay.
https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=538693&Lab=NRMRL

PROOF-OF-CONCEPT FOR THE IN SITU TOXICITY IDENTIFICATION EVALUATION (ITIE) TECHNOLOGY FOR ASSESSING CONTAMINATED SEDIMENTS, REMEDIATION SUCCESS, RECONTAMINATION, AND

SOURCE IDENTIFICATION
Burton, G.A., SERDP Project ER18-1181, 45 pp, 2020

This SEED project addressed DoD's critical need for effective monitoring tools to provide certainty in the decision-making process on critical risk determination components, such as causality, bioavailability, source identification, and fate across ecosystem compartments. iTIES can address all these critical risk determinants cost-effectively. It is a biological, fractionation protocol that systematically identifies chemical classes causing toxicity in overlying water, porewater, and outfalls. The system separates chemical classes of contaminants of concern frequently linked to adverse biological effects at DoD sites. The overall objective of the proposed project was the proof-of-concept of an accurate field methodology for in situ assessment that links chemical class exposures to effects, allowing for more cost-effective monitoring and remediation decisions.https://www.serdp-estcp.org/content/download/50675/498021/file/ER18-1181%20Final%20Report.pdf

USE OF PLANT MATERIALS FOR THE BIOREMEDIATION OF SOIL FROM AN INDUSTRIAL SITE
Nunes, D.A.D, A.M. Salgado, E.F. da Gama-Rodrigues, R.G. Taketani, C.D. da Cunha, et al.
Journal of Environmental Science and Health, Part A 55(6):650-660(2020)

Two low-cost plant residues, sugarcane bagasse (SCB) and *Mimosa caesalpiniifolia* leaf litter (LL), were either added separately or combined to contaminated soil from a petroleum refinery to evaluate improvement in bioremediation area. The soil was analyzed 90 days after treatment. Individually, both amounts of SCB (20 and 40 g/kg) favored the growth of total heterotrophic bacteria and total fungi. In contrast, LL at 20 g/kg better stimulated the hydrocarbon-degrading microorganisms' activity in the soil. However, no TPH removal was observed under any of these conditions. Higher microbial growth was detected by the application of both plant residues in multi-contaminated soil. The maximum TPH removal of 30% was achieved in soil amended with 20 g/kg SCB and 20 g/kg LL. All the experimental conditions revealed changes in the microbial community structure related to the handling of the soil, with abundance of Alphaproteobacteria.

NOVEL PCB-DEGRADING *RHODOCOCCUS* STRAINS ABLE TO PROMOTE PLANT GROWTH FOR ASSISTED RHIZOREMEDIATION OF HISTORICALLY POLLUTED SOILS
Vergani, L., F. Mapelli, J. Suman, T. Cajthaml, O. Uhlik, and S. Borin.
PLoS ONE 14(8): e0221253(2020)

Rhizoremediation was investigated as a method to treat PCB-contaminated soil from the highly polluted SIN Brescia-Caffaro site in Italy using bacterial strains with the potential to degrade PCBs as well as promote plant and root development. Aerobic bacteria from the site were biostimulated by the plant *Phalaris arundinacea*. The isolated strains, selected based on their ability to grow on biphenyl and plant secondary metabolites, were largely dominated by Actinobacteria, and a significant number showed traits of interest for remediation, harboring genes homologous to *bphA* involved in the PCB oxidation pathway and displaying 2,3-catechol dioxygenase activity and emulsification properties. Several strains also showed the potential to alleviate plant stress through 1-aminocyclopropane-1-carboxylate deaminase activity. In particular, three *Rhodococcus* strains were identified that were able to degrade several PCB congeners in vitro and to promote lateral root emergence in the model plant *Arabidopsis thaliana* in vivo. These strains also showed the capacity to colonize the root system and to increase the plant biomass in PCB contaminated soil, making them ideal candidates to sustain microbial-assisted PCB rhizoremediation through a bioaugmentation approach.https://journals.plos.org/plosone/article/file?type=printable&id=10.1371/journal.pone.0221253

MYCOREMEDIATION OF OLD AND INTERMEDIATE LANDFILL LEACHATES WITH AN ASCOMYCETE FUNGAL ISOLATE, *LAMBERTELLA SP.*
Siracusa, G., Q. Yuan, I. Chicca, A. Bardi, F. Spennati, S. Becarelli, D.B. Levin, G. Munz, et al.
Water 12(3):800(2020)

The *Lambertella sp.* Ascomycete fungal strain was isolated from polluted environmental matrices and used to reduce contamination and toxicity of intermediate and old landfill leachates. Batch tests were performed under cometabolic conditions with two different old leachates and suspended and immobilized *Lambertella sp.* biomass. The test resulted in a soluble chemical oxygen demand depletion of 70% and 45%, after 13 and 30 days, respectively. Intermediate landfill leachate was treated in lab-scale reactors operating in continuous conditions for three months, inoculated with immobilized *Lambertella sp.* biomass, in the absence of co-substrates. The *Lambertella sp.* depleted total organic carbon by 90.2%. The exploitability of the *Lambertella sp.* strain was also evaluated in terms of reduction of phyto-, cyto-, and mutagenicity of the different landfill leachates at the end of the myco-based treatment, resulting in efficient depletion of leachate clastogenicity. https://www.mdpi.com/2073-4441/12/3/800/htm

CAPTURE OF PERFLUOROOCTANOIC ACID USING OIL-FILLED GRAPHENE OXIDE-SILICA HYBRID CAPSULES
Ali, M., S.P. Meaney, L.W. Giles, P. Holt, M. Majumder, and R.F. Tabor.
Environmental Science & Technology 54(6):3549-3558

Water-dispersible hybrid capsules were prepared from an oil-in-water emulsion that included a silicate precursor and were stabilized by graphene oxide to grow a strong, mesoporous capsule. The aminated capsules were effectively applied as a novel technology to adsorb and sequester PFOA contamination in water. These capsules were decorated with amine groups to present a positively charged outer corona that attracted the negative PFOA molecules. PFOA removal by the capsules was pH- and PFOA-concentration-dependent, with adsorption efficiencies of >60 mg/g under ideal conditions. PFOA removal kinetics followed using high-performance liquid chromatography and liquid chromatography-mass spectrometry showed that capture of PFOA by the capsules reached a maximum of >99.9% in 2-3 days.

REGENERATION OF WASHING EFFLUENTS FOR REMEDIATION OF PETROLEUM-HYDROCARBONS-CONTAMINATED SOIL BY CORNCOB-BASED BIOMASS MATERIALS
Xu, Z., H. Guo, T. Liu, W. Zhang, and X. Ma. | CS Omega 4(20):18711-18717 (2020)

Modified corncobs were prepared and used as selective adsorbents to remove residual petroleum hydrocarbons from surfactant-enhanced soil washing effluents. The study first characterized the adsorbent structure and optimal conditions. After five cycles, the recovery efficiency of the washing effluents was as high as 75.4%. The optimal adsorbent linear alkylbenzene sulfonates (LAS-Cb) also exhibited excellent recyclability and can be reused five times. The study concludes with proposed selective adsorption mechanisms of the LAS-Cb for petroleum hydrocarbons in washing effluents, which are related to their huge hydrophobic core and surface electronegativity.

METHYL T-BUTYL ETHER-DEGRADING BACTERIA FOR BIOREMEDIATION AND BIOCONTROL PURPOSES
d'Errico, G., V. Aloj, V. Ventorino, A. Bottiglieri, E. Comite, A. Ritieni, R. Marra, et al.
PLoS ONE 15(2): e0228936(2020)

Three potential methyl t-butyl ether (MtBE)-degrading bacterial strains isolated from hydrocarbon-contaminated soil were tested for MtBE degradation ability, *in vitro* and *in vivo* bio-control activity, and induced systemic resistance in tomato plants. *Bacillus aryabhattai* R1B, *S. novella* R8b, and *M. mucogenicum*. R8i grew using MtBE as a carbon source, exhibiting different growth behavior and contaminant degradation ability. Their biocontrol ability was tested against various fungal pathogens (*Rhizoctonia solani* and *Pythium ultimum*) and foliar pathogens (B. cinerea and Alternaria alternata). Both *S. novella* R8b and *B. aryabhattai* were effective in reducing the development of necrotic areas on leaves within 48 hours from *B. cinerea* and *A. alternata* inoculation. *M. mucogenicum* effectively contelled *B. cinerea* after 72 hours. Similar results were achieved using *P. ultimum*, where the application of isolated bacteria increased seed germination. Only *M. mucogenicum* elicited tomato plants resistance against *B. cinerea*. All selected bacterial strains were ineffective against *R. solani*. https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0228936&type=printable

General News

INNOVATIVE TECHNOLOGIES FOR PFAS DESTRUCTION IN INVESTIGATION DERIVED WASTES
Chaplin, B. and T. Holsen. | SERDP & ESTCP Webinar Series, Webinar #111, May 2020

On May 7, SERDP and ESTCP sponsored webinars that highlighted advancements in water treatment technologies for PFAS destruction. SERDP investigators introduced different approaches to eliminating PFAS from groundwater and aqueous investigation derived waste (IDW) specifically, the use of electrochemical membrane technology for PFAS oxidation and plasma treatment processes for IDW. https://www.serdp-estcp.org/Tools-and-Training/Webinar-Series/05-07-2020

WATER TREATMENT MODELING TOOLS FOR REMOVING PFAS AND OTHER CONTAMINANTS
Speth, T., U.S. EPA Water Research Webinar Series, 37 slides, April 2020

Even though carbon adsorption can be an effective treatment technology for removing organic compounds, such as PFAS, from water, it can be expensive or may not achieve desired removal objectives if improperly designed. Proper full-scale design of this adsorption process typically results from carefully controlled pilot-scale studies that are used to determine important design variables, such as the type of adsorbent, empty bed contact time, and bed configuration. This webinar provided an overview of the series of adsorption models, along with examples of how they can be used to help design pilot treatment systems and provide a first-cut prediction of full-scale results. The information generated from the models will provide states and utilities with a better understanding of the fundamentals of carbon adsorption and what that means to the operation, performance, and costs associated with this technology. *See a recording of the webinar at* https://www.youtube.com/watch?v=0w_LBayHg_w&feature=youtu.be

ENVIRONMENTAL SOIL REMEDIATION AND REHABILITATION: EXISTING AND INNOVATIVE SOLUTIONS
Van Hullebusch, E., D. Huguenot, Y. Pechaud, M.-O. Simonnot, and S. Colombano (eds). Springer International Publishing, Hardcover ISBN: 978-3-030-40347-8, eBook ISBN: 978-3-030-40348-5, 429 pp, 2020

In seven chapters, this book provides a comprehensive overview of innovative remediation techniques and strategies for soils contaminated by heavy metals or organic compounds. It includes chapters on various novel chemical remediation approaches used alone and in combination with physical and thermal treatment, recovery of NAPLs, reuse of leaching solutions, in-situ chemical reduction and oxidation, and the chemical enhancement of physical NAPLs recovery from both practical and theoretical perspectives. The book also presents the state-of-the-art in waste-assisted bioremediation to improve soil quality and the remediation of petroleum hydrocarbons. *View the table of contents and abstracts at* https://link.springer.com/book/10.1007/978-3-030-40348-5#about

ADVANTAGES AND LIMITATIONS OF IN SITU METHODS OF BIOREMEDIATION
Sharma, J. | Recent Advances in Biology and Medicine 5:955923(2019)

The major types of in situ bioremediation rely on natural processes to degrade contaminants with (enhanced) or without (intrinsic) amendments. Removal rates and extent vary based on the contaminant of concern and site-specific characteristics. There are a few factors and variables that affect the rate of removal such as contaminant and co-contaminant distribution as well as concentration; indigenous microbial populations and reaction kinetics; and parameters such as pH, moisture content, nutrient supply, and temperature. Many of these factors are a function of the site and the indigenous microbial community and, thus, are difficult to manipulate. Specific technologies may have the capacity to manipulate some variables and may be affected by other variables as well; these specific issues are discussed with each technology. https://rabm.scholasticahq.com/article/10941.pdf

REMEDIATION OF MERCURY CONTAMINATED SOIL, WATER, AND AIR: A REVIEW OF EMERGING MATERIALS AND INNOVATIVE TECHNOLOGIES
Wang, L., D. Hou, Y. Cao, Y.S. Ok, F.M.G. Tack, J. Rinklebe, and D. O'Connor.
Environment International 134:105281(2020)

Recent developments in technological approaches to remediate Hg-contaminated soil, water, and air are evaluated in this review, with a focus on emerging materials and innovative technologies. The article reviews extensive research on various nanomaterials, such as carbon nanotubes, nanosheets, and magnetic nanocomposites and emerging materials for mercury removal, including graphene, biochar, metal organic frameworks, covalent organic frameworks, layered double hydroxides, as well as clay minerals and manganese oxides. The performance of adsorption/desorption, oxidation/reduction, and stabilization/containment using these materials are examined, as are technologies involving microorganisms, such as phytoremediation, algal-based removal, microbial reduction, and constructed wetlands.

A REVIEW OF ELECTROKINETICALLY ENHANCED BIOREMEDIATION TECHNOLOGIES FOR PHS
Saini, A., D.N. Bekele, S. Chadalavada, C. Fang, and R. Naidu.
Journal of Environmental Sciences 88:31-45(2020)

This review examined the range of technologies to remediate petroleum hydrocarbons in subsurfaces with a specific focus on bioremediation and electrokinetic remediation and the efficiency of combining the two. Knowledge gaps of these technologies and techniques are identified to develop new technologies and more efficient ways of utilizing existing technologies.

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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