Technology Innovation News Survey

Entries for August 1-15, 2017

Market/Commercialization Information

FY 2018 SERDP SUPPLEMENTAL SOLICITATION
Strategic Environmental Research and Development Program (SERDP), 2017

The FY 2018 supplemental solicitation seeks research and development projects that will be executed through a competitive process, limited to no more than $200,000, and of about one year’s duration. Successful projects may be considered for additional follow-on funding. All submissions must respond to a SERDP Statement of Need, such as the two SoNs under Environmental Restoration:

- **ERSN-18-1:** Innovative approaches for treatment of waste derived from per- and polyfluoroalkyl substance (PFAS) subsurface investigations.
- **ERSN-18-2:** Defining knowledge gaps in the understanding of PFAs in the subsurface.

Researchers from universities, federal organizations, and private industry can apply for funding. A webinar—SERDP Funding Opportunities: FY 2018—will be presented September 25, 2017. Proposals must be received no later than 2:00 PM ET on October 19, 2017. https://www.serdp-estcp.org/Funding-Opportunities/SERPDSolicitations

EPAB SBIR PHASE I FISCAL YEAR 2018
U.S. Army Research, Development & Engineering Command, ARL, 2017

U.S. EPA anticipates awarding about 12 firm-fixed-price contracts of $100,000 each under the Small Business Innovation Research (SBIR) Program Phase I during FY 2018. Among the six topic areas identified by the Agency, the needs for R&D on per- and polyfluoroalkyl-related compounds may be of particular interest to the cleanup community:

- **Clean and Safe Water:** (A) Removal of PFOS/PFOS from drinking water; and (B) Removal of PFDA/PFOS from wastewater.
- **Levend Remediation:** Remediation of PFAS-contaminated soil and sediment.

The anticipated closing date for the FY 2018 solicitation is December 17, 2017, with proposals likely received by December 7, 2017. Phase I awards are anticipated by June 30, 2018, each with a 6-month period of performance. An informational webinar will be held on Thursday, September 28, 2017. More information on the event will be posted at https://epa.gov/epaoswer/sbir. After the webinar, slides and answers to questions will be posted at https://www.epa.gov/epaoswer/sbir/SBIRwebinars.html. It is noted that it might be necessary to copy and paste the URL into your browser for direct access.

Sources sought on professional services for USEPA Superfund GE-PITTSFIELD/HOUSATONIC RIVER CLEANUP PROJECT
U.S. Army Corps of Engineers, USACE District, New England, Concord, MA.

The U.S. Army Corps of Engineers, New England District seeks to determine interest, availability, and capability of (a) HERZone, small business, service-disabled veteran-owned small business, and woman-owned small business concerns under NAICS code 541620 (Environmental Consulting Services). Since then, EM has reviewed the capabilities statements submitted and developed an acquisition plan. This requirement is expected to be competitive if a procurement resulting in a singleaward IDIQ contract with a 12-month period of performance with a maximum potential value of approximately $100 million. The agency is tentatively anticipating issuing the final RFP within the next 30-45 days (i.e., by or before the end of October). Contract award is expected in or about the second quarter of Government FY 2018. Interested parties are advised to watch for updates on the DOE OMB procurement website at https://www.govisz/govisz/portal/Agencies/DOE. For further information contact Hatch, R.R. (508) 569-3238. Note: (Note: It might be necessary to copy and paste the URL into your browser for direct access).

SLUDGE REMOVAL AND SOIL REMEDIATION
Department of the Army, Combat Command, 9 CONG, Beale AFB, CA, 2017

As of May 31, 2017, the US Army Corps of Engineers, Beale Air Force Base, California intends to award a fixed-price contract for removal of sludge and remediation of soil containing iron, manganese, barium, beryllium, and chromium. The period of performance is 60 days after contract award. Interested parties are encouraged to monitor FedBizOpps closely as all proposals must be received no later than 2 days after release of the final synopsis/solicitation.

Clean up News

In situ Remediation of Chlorinated Solvent-Contaminated Groundwater Using ZVI/Organic carbon Amendement in China: Field Pilot Test and Full-Scale Application
Yang, J., L. Meng, and L. Guo.

Environmental Science Pollution Research Int. [12 pp - Publication online only in print]

In situ chlorinated solvent amendment injection was conducted to enhance reductive dechlorination of chlorinated solvents in groundwater in a low-permeability aquifer at a active manufacturing facility in ShangHai, China. A field pilot test of a commercially available organic amendment, EHC®, at the clay fill site was followed by full-scale application to address 1,1-TCA, 1,1-DCA, 1,1-DCE, and chloroethane. EHC combines zero-valent iron and organic carbon. Pilot results showed that direct-push EHC injection efficiently facilitated in situ reductive dechlorination, achieving mean removal rates of 99.6% 1,1-TCA, 99.3% 1,1-DCA, and 73.3% 1,1-DCE at 270 days post-injection, considerably higher than those of VC and chloroethane (42.3 and 37.1%, respectively). Clear decreases in oxidation-reduction potential and dissolved oxygen concentration and increases in Fe(II) and total organic carbon concentration observed during the monitoring period indicate that EHC promotes the anaerobic degradation of chlorinated hydrocarbons primarily via long-term biological reductive dechlorination, with instantaneous chemical reductive degradation acting as a seepage pathway. The optimal effective time of EHC injection was 9-95 days, and its radius of influence was 1.5 m. In full-scale application, the maximum concentrations of 1,1-TCA and 1,1-DCA in the contaminant plume fell below the relevant Dutch Intervention Values at 180 days post-injection. The dynamics of the target pollutant concentrations mirrored those of the pilot test.

TWO MOTHER SOIL VAPOR EXTRACTION UNITS ACHIEVE CLEANUP GOALS
Gribenholt, A.

U.S. Air Force Civil Engineer Center News, 19 July 2017

The remediation program at the former Mather Air Force Base in California took another stride forward this summer when two of three soil vapor extraction (SVE) units achieved their cleanup goals. The third unit is scheduled for in-place remediation. Remediation consists of in-situ excavation and air sparging/solvent vapor extraction. About 5,600 L of free-phase creosote was recovered during the trial. Area PTA2, located over the southern edge of the site, was used. Removing vaporized contaminants from the deep soil in this area has been completed and the Air Force is working with regulatory agencies. Demolition of the creosote-contaminated water pump station was completed on August 22, 2017. The area is scheduled to receive an active soil cap and recommence in-place remediation.

Demonstrations / Feasibility Studies

VASTINT UK BV, STRAND EAST, SUGAR HOUSE LANE, STRATFORD, ADDENDUM: GROUNDWATER REMEDIATION STRATEGY REPORT
London Legacy Development Corporation, 75 pp, 2016

The site is located in Stratford, London, occupying 6 hectares. The site has been delineated to ground level, with remediation and earthworks ongoing at the time of writing. This site is scheduled for regeneration of a mixed-use scheme by 2020. The existing remediation strategy is to reduce or remove DNAPL in the north of the site. A pilot trial was implemented between February and July 2015 to inform the remediation approach for deep groundwater affected by DNAPL consisting primarily of creosote and tar. The trial in area PTA1, located over the highest recorded DNAPL thicknesses, comprised DNAPL removal via air sparging/solvent vapor extraction. About 5,600 L of free-phase creosote was recovered during the trial. Area PTA2, located over the southern edge of the site, was used. Sampling of soil was obtained in situ chemical oxidation (ISCO) using persulfate and H2O2. Results indicated that ISCO is unsuitable for further use at the site. The trials were designed to test the reactivity and performance of the remediation strategy for Pentamethyldiethylenetriamine (PMDETA) and PyroAAP/PMDETA through process proof of concept and the development of appropriate lines of evidence for verification of full-scale remediation. Full details of the completed trials are given in the 34-page in-situ pilot trial technical report presented as Appendix 1 in this Addendum to the original report. A northern site has been selected for implementation of the proposed strategy in the final report, which contains recommendations for site specific remediation.
A remediation pilot test to address a commingled plume containing BTC, chlorinated pollutants, and pharmaceuticals was attempted using a combination of approaches, including a pump and treat system, enhanced with biostimulation and the use of advanced oxidation processes and targeted direct-push injection of calcium peroxide. The treatment process was monitored intensively using conventional and passive sampling methods, including next-generation amplicon sequencing. Results showed that the injection of oxygen-saturated treated water with residual H₂O₂ and elevated temperature enhanced the biodegradation of the contaminants detected in situ. Enhanced biodegradation of the contaminants was achieved by applying a combination of in situ biostimulation and an advanced oxidation process. The PAH concentrations did not differ significantly between the slurries and their sterilized controls. No degradation occurred in the slurries under anaerobic conditions. In the pilot-scale columns under water-saturated conditions, atrazine, DEA, and BAM were not detected in effluents at 33, 64, and 64 days, respectively, from the beginning of water flow through EHC® columns, but traces of the compounds could be detected in groundwater. The effect of arsenic (As) contamination on the biodegradation of PAHs was explored in an aerobic slurry system and under anaerobic conditions. The metagenome of the slurry system was sequenced using high-throughput sequencing, and the identified genes were analyzed for their potential roles in biodegradation and biostimulation. The results showed that the diversity of the bacterial community was significantly increased under aerobic conditions, which could be attributed to the enhanced biodegradation of PAHs. The data collected from review papers and case studies (0-5 y), with a particular focus on pore water quality and plant phytostabilization activities (plant self-sustaining, toxicity). Screening of the most promising materials was carried out according to whether metallic elements were mobilized/immobilized from pore water through speciation changes (not including microbial mediation), as sequenced into rhizosphere or plant aboveground parts. Results showed that a mixture of organic and inorganic materials were more efficient than organic or inorganic alone to reclaim contaminated sites, especially the combination of matured and composted animal manures with inorganic materials (e.g., hydrated lime).


A zero-valent iron and organic matter degradation product removes sulfide and enhances biodegradation product removal in subsurface waters

Kerminen, K., V. Salovaara, and M.H. Kontro.

Environmental Pollution 229:159-167(2017)

THE USE OF CARBON ADSORBENTS FOR THE REMOVAL OF PERFLUORALKYL ACIDS FROM POTABLE REUSE SYSTEMS

Jones, M. K. E.-K., A. Mathison.

Chemosphere 184:168-175(2017)

KINETIC ANALYSIS OF AEROBIC BIOTRANSFORMATION PATHWAYS OF A PERFLUOROCETANE SULFONATE (PFOS) PRECURSOR IN DIFFERENT SOILS


Environmental Pollution 229:159-167(2017)

COLD BREAK

Stockemann, E.


Bacillus matching/blending and cell concentration takes advantage of biotechnical mechanisms for biotransformation, bioreduction or bioremoval of heavy metals. This study projected the blending of

Although bioremoval or immobilization of heavy metals in leachate-contaminated soil is possible with the use of designated microbes, manipulation of bacteria in relation to diversity manipulation of biostimulation takes advantage of biotechnical mechanisms for biotransformation, bioreduction or bioremoval of heavy metals. This study projected the blending of

Nano-sulfonated graphene (SGE) was used as an ex situ washing agent to evaluate different processing parameters for the ectopic leaching removal of PAHs from a coking plant soil. X-ray photoelectron spectroscopy (XPS) and fourier transform infrared spectroscopy (FTIR) were used to analyze the characteristics of the SGE tested. Results showed that SGE had a strong adsorption affinity for PAHs, achieving 80% removal of polycyclic aromatic hydrocarbons (PAHs) under optimum conditions (5 mg/mL SGE concentration of 2000 mg/L). The removal efficiency was 90% for pyrene and 92% for Phenanthrene. The adsorption of PAHs by SGE was further investigated using a combination of scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDS).

The PAH removal rate decreased with increasing the number of PAHs. After one washing cycle at SGE concentration of 2000 mg/L and L/S ratio of 1:10, the PAH removal rate was much higher than the rate obtained using Tween 80 or methyl-ß-cyclodextrin. This paper is temporarily Open Access at http://dx.doi.org/10.1016/j.scitotenv.2017.06.085

Based on the results obtained in this study, it can be concluded that the use of Nano-sulfonated graphene (SGE) as an ex situ washing agent is a promising approach for the removal of PAHs from contaminated soils. The adsorption of PAHs by SGE was found to be high and selective, and the recovery of PAHs from the soil matrix was efficient. The study also demonstrated that the use of Nano-sulfonated graphene (SGE) as an ex situ washing agent can be a cost-effective and environmentally friendly method for the removal of PAHs from contaminated soils.

RESEARCH

The present study investigated the removal of PAHs from a coking plant soil using Nano-sulfonated graphene (SGE). The results showed that the use of SGE as an ex situ washing agent is an effective and practical method for the removal of PAHs from contaminated soils. The removal efficiency was high, and the recovery of PAHs from the soil matrix was efficient. The study also demonstrated that the use of Nano-sulfonated graphene (SGE) as an ex situ washing agent can be a cost-effective and environmentally friendly method for the removal of PAHs from contaminated soils.
BIOSURFACTANT-ENHANCED BIOREMEDIATION OF AGED POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) IN CREOSOTE CONTAMINATED SOIL


The potential for biological treatment of complex petrochemical contaminants was evaluated using creosote-contaminated soil in ex situ bio-slurry reactors to investigate the efficacy of biodegradation of PAHs in soil. The bioremediation process was purified and characterized using FTR spectroscopy. Biodegradable lipids and surfactants were added to the bioremediation process. PAH biodegradation was enhanced when the surfactant was added. The reduction efficiency of PAHs was 89.6% with addition of biodegradable lipids and 48.4% with biodegradable lipids and surfactant. The addition of biodegradable lipids and surfactant allowed the PAHs to be degraded completely.

BIODEGRADATION OF ISOPRENOIDS, STERANES, AND PHENANTHRENES DURING IN SITU BIOREMEDIATION OF PETROLEUM-CONTAMINATED GROUNDWATER


In an evaluation of metal reduction through bioaugmentation in leachate-contaminated soil, bacteria species resident in landfill soil were amended to increase their diversity and used in a bioremediation system. The reduction efficiency of cyanobacillaceae sp., Bacillus sp., and Rhodococcus sp. was >70% for Pb2+, Al3+, and Cr6+

PAPERCHAIN PROJECT: ESTABLISHING A NEW CIRCULAR MODEL BETWEEN THE MINING SECTOR AND THE PULP & PAPER INDUSTRY TO PREVENT ACID MINE DRAINAGE


The European Pulp and Paper Industry generates 11 million tonnes of waste yearly. Most of it is burned for energy recovery or used for landspreading, but around 1.5 million tonnes go to landfill. Green liquor dregs (GLDs) are the largest waste fraction retrieved in the chemical recovery cycle at the sulfate pulp mills. About 240,000 tonnes are landfilled in Sweden alone each year because their only current application is as final landfill cover layers. The mining sector also can benefit from GLDs as alternative material for covers to reduce raw material consumption in resource intensive industries. PAPERCHAIN, a research and innovation project funded by the European Commission, addresses this potential resource to demonstrate the technical, economic, social, and environmental feasibility of using these waste materials from the Circular Economy perspective. https://www.imwa.info/docs/imwa_2017/IMWA2017_Licago_852.pdf

ENHANCED Mn TREATMENT IN MINE DRAINAGE USING AUTOCATALYSIS IN A STEEL SLAG-LIMESTONE REACTOR


Modified steel slag and manganese (Mn) sand reactors were operated for one year to evaluate their ability to remove Mn. The steel slag reactor showed the lowest Mn concentration, below 0.2 mg/L, but Mn concentration was 0.5 mg/L in the Mn sand reactor. The reactor consisting of steel slag and limestone showed a capacity to accumulate autocatalytic Mn (hydr)oxides for 160 bed volumes, bringing Mn to below 2 mg/L from an initial concentration of 30-50 mg/L, and produced outflow with the lowest pH of 7-9. The reactor also maintained Mn at 0.2 mg/L.

EFFECT OF HYDRAULIC RESIDENCE TIME AND TEMPERATURE ON THE PERFORMANCE OF THE INTEGRATED SEMI-PASSIVE BIOPROCESS


Researchers investigated system performance of an integrated semi-passive bioprocess for simultaneous sulfide reduction and partial sulfide oxidation within a single linear-flow channel reactor unit as a function of the operating conditions of hydraulic residence time, temperature, and reactor size. The study aims to contribute to the characterization of a novel integrated bioprocess from an engineering and microbial ecology perspective. https://www.imwa.info/docs/imwa_2017/IMWA2017_Hamers_263.pdf

ORICA BOTANY GROUNDWATER CLEANUP PROJECT: DNAPL AND GROUNDWATER REMEDIATION TECHNOLOGY ANNUAL REVIEW NO. 11

Report No. DNR.11-09.03.P007, 29 pp, 2017

The Orkla Botany Groundwater Cleanup Clean-up has been achieved by groundwater extraction along three containment lines and ex situ treatment of the water in the groundwater Water Treatment Plant to address 1,2-dichloroethane and carbon tetrachloride contamination. This report describes the technologies currently in use and innovative technologies under evaluation. No full-scale in situ groundwater cleanup has yet been conducted in the reporting period to investigate and develop biotechnology techniques. http://www.orica.com/ArticleDocuments/993/Annual%20Groundwater_DNAPL_Technology%20Report%202017.pdf.aspx

General News

REMEDICATION AND RECOVERY: INTERNATIONAL IN-SITU THERMAL TREATMENT (ITT2) SYMPOSIUM, MAY 30-31, 2017, BANFF, ALBERTA, CANADA

ITT2 Website, 464 pp, 2017

The goal of the 2-day ITT2 symposium was to share knowledge and experience on in situ thermal remediation and recovery technologies to provide the attendees with an informed and unbiased understanding of how these processes might be used. Eighteen presentations from the meeting have been compiled into a PDF file and made available for download via a link at http://www.ittsymposium.org/2017/Karol%20Burgess%20ITTT2%20Proceedings.pdf

SUPERFUND REMEDIATION REPORT, FIFTEENTH EDITION

U.S. EPA, Office of Superfund Remediation and Technology Innovation, Aug 2017

The 15th edition of the Superfund Remedy Report focuses on Superfund remedial actions selected in fiscal years 2012-2014 and on remedy trends since 1982. The report includes remedies selected in 308 decision documents (Records of Decision [RODs], ROD amendments, and Explanations of Significant Differences with changes to remedy components) signed in this 3-year period. The report contains an overview of remedy selection and details on overall remedy selection and remedies for source materials (soil and sediment), surface water, groundwater, and air (i.e., vapor intrusion). https://remedi.gov/2017/08/03/sup15trends.pdf

ABSTRACT BOOKLET: 9TH INTERNATIONAL PASSIVE SAMPLING WORKSHOP, MAY 31 & JUNE 1-2, 2017, TORONTO, ONTARIO CANADA

Workshop attendees gave presentations on passive samplers for targeted chemical classes; identified novel passive sampling devices for targeted matrices (i.e., air, water, sediment, soil, and biota); and discussed passive sampling applications and case studies. http://ospw2017.waps.org/wp-content/uploads/sites/4/2017/05/9PSW2017_booklet.pdf

HARVARD, UNIVERSITY OF RHODE ISLAND RESEARCHERS TO STUDY CHEMICAL CONTAMINATION OF US WATERS

URI, 15 Aug 2017

University of Rhode Island (URI) and Harvard University professors are collaborating through a new research center to study perfluorinated compounds, which have contaminated water at sites nationwide. Although the chemicals are not regulated in drinking water, water reportedly has been contaminated with them near sites of industrial facilities and U.S. military bases. The 5-year, $898 grant from the National Institute of Environmental Health Sciences establishes URI as part of a national network of Superfund Research Program centers. The center will focus on gaining a better understanding of how perfluorinated chemicals make their way into water and through the food chain, and affect people and animals. https://www.uri.edu/news/2017/08/15/20170815 propulsioncenter.html

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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