Technology Innovation News Survey

Entries for June 16-30, 2018

Market/Commercialization Information

SUPERFUND TECHNICAL ASSESSMENT RESPONSE TEAM (START)
Environmental Protection Agency, Office of Research and Development, Offfice of Chicago. Federal Business Opportunities, FBO-591, Solicitation 586B5180005, 2018

U.S. EPA Region 5 will soon release an RFP to fulfill upcoming Superfund Technical Assessment Response Team (START) requirements for contractor support and consulting services to evaluate the environmental impacts of a proposed mining operation in Lake County, Minnesota. The agency anticipates that the RFP will be released in early June. The solicitation is expected to be for up to three years, with a maximum value of $250,000. The purpose of the START is to provide technical expertise to assist EPA in its determination of the potential environmental and public health impacts of the proposed mining project.

ENVIRONMENTAL A/E SERVICES
Department of the Army, U.S. Army Corps of Engineers, USACE District, Baltimore, MD. Federal Business Opportunities, FBO-576, Solicitation W912DR-18-S-0009, 2018

The U.S. Army Corps of Engineers, Baltimore District plans to issue an RFP on or about August 3, 2018, as an (R) small business set-aside for services for the Defense Supply Center Philadelphia (DSCP) BWI site in Baltimore, Maryland. The purpose of the solicitation is to provide support to DSCP BWI’s Environmental Affairs (E/A) Office in completing the fourth tier environmental enhancement plan. The solicitation is expected to be for up to three years, with a maximum value of $200,000.

SYNOPSIS FOR HANFORD SITE TECHNICAL SERVICES SOLICITATION
Department of Energy, Hanford Operations, Richland, WA, Federal Business Opportunities, FBO-595, Solicitation 89030418R0000005, 2018

When DOE releases RFP 89030418R0000005 for the Hanford Site Technical Services Solicitation, the procurement will be an (R) small business set-aside with a maximum value of $8 million. The Hanford Site Technical Services Solicitation will provide support, including highly qualified, innovative professionals and technical and subject-matter experts as needed—for activities involving engineering, management consulting, and hazardous waste collection and treatment at the Hanford Site. New contracts resulted from the solicitation will replace current contracts in the process of being idled in December 2016. Also in December 2016, an area of VOC-contaminated groundwater beneath the thermal treatment zone was further addressed by installation and operation of two additional treatment systems.

Cleanup News

BSC SEMIC-ANNUAL MONITORING AND PERFORMANCE REPORT, REV. 1: JULY 1 TO DECEMBER 31, 2017, PERCHLORATE BIOREMEDIANIZATION SYSTEM, HENDRERSON, NEVADA
Nevada Div. of Environmental Protection, Bureau of Industry Site Cleanup (BISC), 178 pp, 2018

This monitoring and performance report for the perchlorate treatment system at Henderson, Nevada, documents groundwater monitoring and fluidized bed reactor (FBR) remediation system data from April 2015 through December 2017, as well as the results of the annual groundwater treatability study. The groundwater treatment system is based on a 9,000 ft² building located within a 1.77-acre site in Henderson. The FBR system began operation in late September 2012 and is designed to remove perchlorate from groundwater extracted from the Valley Auto Mall, a 1.77-acre site located within the Henderson groundwater bearing zone below the Las Vegas Wash. The treatment system comprises 14 extraction wells, a water handling and FBR treatment plant, and a discharge system. The FBR plant consists of two first-stage FBRs that contain sand while a second-stage FBR contains granular activated carbon (GAC) and a biofilm. Microorganisms growing as a film on the media utilize metabolic pathways to reduce perchlorate, nitrate, and oxygen in redox reactions that result in nitrogen, carbon dioxide, and ethane. Ethane is added as an electron donor along with nutrients (di-ammonium phosphate/urea mixture) and other trace elements. The pH is adjusted through the addition of soda ash (sodium carbonate).

SEREBAR: A REVIEW OF 11 YEARS OF OPERATION
CLAIREF Case Study Bulletin, 5, 12, 2018

The Sequel Reactive Barrier (SEREBAR) groundwater treatment system is a permeable reactive barrier (PRB) that was constructed on a former gasworks site in 2003. It was one of the first biologically based PRBs systems installed in the UK. SEREBAR has been in operation since then and this bulletin provides a review of the system’s performance over the period 2004 to 2015. This effort forms one of the longest running research projects of its kind in the world and one of the few that has provided active contamination management on a commercial scale. For situations where the system was installed, the PRB performed very effectively in maintaining hydraulic control over the contaminant plume and treating the target contaminants, including PAHs, BTEX and other volatile organic compounds (VOCs), trihalomethanes (THMs), and perchlorate.

SITE-WIDE GROUNDWATER PROGRESS REPORT FOR THE FORMER HOFFMANN-La ROCHE INC. FACILITY, NUTLEY, NEW JERSEY
Hoffmann-La Roche Remediation Project Website, 50 pp, 2017

The total of 59 confirmed groundwater contaminants for this site includes chlorinated VOCs, SVOCs, 1,4-dioxane, pesticides, and metals. In well air stripping (IWAS) and cation injection addition, and the LA-14 interim remediation system (MIR) in August 2015 and continue to the present. LA-2 in situ thermal treatment operations were completed in early 2016. The VOC plume south of the LA-2 Task Farm, which had migrated into the northern portion of IA-6, was successfully remediated with an IWAS system (99.9% VOC reduction), and these wells were idled in December 2016. Also in December 2016, an area of VOC-contaminated groundwater beneath the thermal treatment zone was further addressed by installation and operation of two additional treatment systems. The project has generally provided an effective polishing plume, removing residual contaminants to acceptable concentrations before discharge downgradient (overall contaminant mass removal >99%). The SEREBAR system was probably over-engineered for the expected contaminants (PAHs and BTEX), but this provided the flexibility to counter localized changes in groundwater contaminant concentration, the increasing cyanide concentration in particular. Aeration of the oil-ergerating soil separator proved useful in increasing the system’s biodegradation capacity.

In Situ Bioremediation of a DNAPL Source Plume: 8 Years of Performance Data
Jacob C.L. Geological Society of America, with Papers 4(6) Paper 69-32/00

Full-scale treatment of a source zone and 12-acre plume began in 2005 beneath an active manufacturing building near Portland, Oregon, using food-grade vegetable oil (VO). Contamination occurs within a shallow alluvial aquifer at 10-30 ft, underlaid by a competent aquitard. DNAPL was observed, and the maximum baseline concentration in groundwater was 1,170,000 ppm. Based on monitoring data collected during and after treatment, the relative mass loss is 80% in the source and plume, respectively, with low levels of VC and end products ethene and ethane. Effective treatment was achieved at a low cost and with minimal disruption to manufacturing operations using a 2-y injection frequency. A coarse emulsion of VO and potable water was injected into 18 source wells on 10-15 ft intervals. Also in December 2016, an area of VOC-contaminated groundwater beneath the thermal treatment zone was further addressed by installation and operation of two additional treatment systems. Source zone VO injection resulted in active biodegradation in the source and up to 80% VOC mass loss downgradient, and in decreased total chlorinated ethene molar mass in the source and throughout the downgradient plume. Increased TOC and methanogenic anaerobic conditions characterized the plume through the defined treatment zone. Source zone VO injection resulted in substantial VC and some ethane/ethane predominance. Detection of acetylene in source zone groundwater indicates concurrent abiotic mass destruction. Downgradient wells have transitioned from cDCE to ethane/ethane predominance and total chlorinated ethenes have decreased by 99% throughout the downgradient plume.
PCB homolog distributions identified two PCB sources to the AOC. Based on these findings, recommendations are made regarding situations where these taxa can be used singularly, in concert, or elevated in the area compared to reference conditions. Patterns of contamination were strikingly similar between taxa, but were higher in tetragnathids at the most contaminated sites. Spider population structure was used to infer the limitations and influential parameters of function-directed soil remediation techniques in the presence of contaminated materials in construction sites.

BIOREMEDICATION OF OIL AND HEAVY METAL CONTAMINATED SOIL IN CONSTRUCTION SITES: A CASE STUDY OF USING BIOVENTING-BIOSPARGING AND PHYTOEXTRACTION TECHNIQUES

Esfandi, E. and S.H.S. Isotad.
Cornell University, eprint arXiv:1806.03717, 2018

Activities at a construction site located in Garmdareh, Karaj, Iran, contaminated the site with BTEX, PAHs, and heavy metals. Coupled bioventing-biosparging and phytoextraction were implemented to remediate the deep and shallow layers of the contaminated site, respectively. The widespread presence of cement components (as dust, particles, and structures or large remnants) and the layering nature of the substrate make the problems more challenging. Based on the findings, a conceptual model for a highly complicated and mature DNAPL source zone. The refinement sheds light on details that will help future remedial action avoid failure due to conditions that otherwise might not be well understood.

Research

VEGETAL REMEDIATION STRATEGY


Demonstrations / Feasibility Studies

USING FROZEN BARRIERS FOR CONTAMINATION REMEDIATION

Wagner, A.H. and E. Yarmak Jr.
ERDC/CHL TR-17-14, 56 pp, 2017

In the summer of 2011, a full-scale field test of a frozen soil barrier was deployed at the Cold Regions Research and Engineering Laboratory site, Fort Wainwright, Fairbanks, Alaska. Hybrid thermosyphon systems, a more efficient cooling technology than conventional ground freezing, were used to create the frozen soil barrier. The hybrid units were actively cooled by a 4.5 kw refrigeration compressor. An initial vertical frozen barrier of 6 feet (1.8 meters) was created in 42 days, and the barrier was 1.6 meters in 48 days. The frozen barrier installation has demonstrated that this technology can freeze the ground quickly. At the end of winter 2012, the barrier was ~3.8 in thick, a thickness maintained throughout the summer of 2012. Only the top 0.5 feet of the cold soil barrier was left unfrozen. As a result of the results, it was found that constructing and O&M costs of the frozen barriers are in pari with other barrier systems.

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throughout the lake had PCB tissue concentrations, leading to wider exposure risk. The inclusion of PCB exposure measures at several trophic levels provided multiple lines of evidence to the scope of exposure through the aquatic and riparian food web, which aided in assessing risk and developing potential future remediation strategies.

EVALUATION OF PASSIVE SAMPLING METHODS AND NON-EQUILIBRIUM ADJUSTMENT METHODS IN A MULTI-YEAR SURVEILLANCE OF SEDIMENT POOLWATER PCBs
Sanders, J.P., N.A. Andrade, and U. Ghosh.
Environmental Toxicology and Chemistry [Published online 5 Jul 2018 ahead of print]

Several different methods of analyzing for passive sampler neocuprine using performance reference compounds (PRCs) have been proposed, and this study explores the practical impacts of these methods in an applied context resulting from a multi-year passive sampling surveillance of PCB concentrations in sediment pore water at a contaminated marsh amended with activated carbon. Using the Upland Testing, Inland Testing, and Ocean Disposal manuals.

BRAC AND EPA'S FEDERAL FACILITY CLEANUP PROGRAM: THREE DECADES OF EXCELLENCE, INNOVATION AND REUSE

In addition to military installations, federal facilities encompass former nuclear weapon complexes, abandoned mines, and landfills. Types of contamination include radioactive waste, munitions and unexploded ordnance, mining waste, fuels and solvents. There are 174 facilities on the National Priorities List, and EPA is responsible for overseeing their cleanup under the Superfund law.

PERSISTENT REDUCTIONS IN THE BIOAVAILABILITY OF PCBs AT A TIDALLY INUNDATED PHRYGIMITES AUSTRALIS MARSH AMENDED WITH ACTIVATED CARBON

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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Phragmites australis (marsh) was used as a model for vegetation. The amendments tested were granular AC (GAC), GAC with a layer of sand, and a pelletized fine AC (PAC). Key metrics presented include vertically resolved black carbon concentrations in sediment and PCB concentrations in sediment, pore water, and several invertebrate species. The results showed that the choice of carbon amendment, sediment porosity, and presence of macrophytes all influenced PCB bioavailability in the sediment.

General News

METHYLMERCURY SCREENING MODELS FOR SURFACE WATER HABITAT RESTORATION: A CASE STUDY IN DULUTH-SUPERIOR HARBOR

ERDC/EL TR-17-19, 59 pp, 2017

The project of developing a screening tool for evaluating potential habitat for vegetation was being assessed for changes in long-term bioavailability of Hg to wildlife and humans. The three models (SERAFM, HERMES, and WASP) used in this study were applied in different ways to explore the strengths of each model. The models were used to evaluate the potential for methylmercury bioavailability to affect the aquatic food web at the site. The models were applied to the existing conditions and the proposed restoration scenarios.

MERCURY REMEDIATION TECHNOLOGY DEVELOPMENT FOR LOWER EAST FORK POPLAR CREEK: FY 2017 PROGRESS REPORT

ERDC/EL SR-17-1, 26 pp, 2017

The project of evaluating the potential for mercury bioavailability to affect the aquatic food web was being assessed for changes in long-term bioavailability of Hg to wildlife and humans. The three models (SERAFM, HERMES, and WASP) used in this study were applied in different ways to explore the strengths of each model. The models were used to evaluate the potential for methylmercury bioavailability to affect the aquatic food web at the site. The models were applied to the existing conditions and the proposed restoration scenarios.

New Technology Development

AMENDMENTS REMOVED FROM ACTIVATED CARBON-AMENDED SEDIMENT TO REDUCE PCB BIOAVAILABILITY

Environmental Toxicology and Chemistry [Published online 5 Jun 2018 ahead of print]

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