Technology Innovation News Survey

Entries for March 1-15, 2018

Market/Commercialization Information

A-E INDEFINITE DELIVERY CONTRACTS FOR ENVIRONMENTAL SERVICES
Department of the Army, U.S. Army Corps of Engineers, USACE District, Tulsa, OK.
Federal Business Opportunities, FBO-5985, 2018

The Tulsa District intends to award the following indefinite delivery contracts: three unrestricted; one small business; one HUBZone; and one woman-owned small business. The mission of the USACE Regional Planning and Environmental Center (RPEC) calls for broad support of environmental compliance, restoration, pollution prevention, and conservation programs for all approved federal customers and the civil works program. RPEC must provide a wide range of A-E environmental services to support large and small projects of varying complexity. Each of the four solicitations constitutes a request for submittal of SF330 packages under NAICS code 541330 (small business size standard $15M). Firms will be selected for negotiation based on demonstrated competence and qualifications for the required work. Awards are anticipated on or about July 30, 2018, each with a maximum contract capacity of $8.2M, consisting of a 3-year base period ($6.2M capacity) and one 2-year option period ($2M capacity). Interested firms having the capabilities and qualifications to perform this work may submit an SF330 package at https://safe.amrdec.army.mil/SAEF/ by 2:00 PM CT on May 11, 2018.

- **Unrestricted**, Solicitation W912BV18R0008: https://www.fbo.gov/spg/USA/COE/DACA56/W912BV18R0008/listing.html
- **Small Business**, Solicitation W912BV18R0009: https://www.fbo.gov/spg/USA/COE/DACA56/W912BV18R0009/listing.html
- **HUBZone Small Business**, Solicitation W912BV18R0010: https://www.fbo.gov/spg/USA/COE/DACA56/W912BV18R0010/listing.html
- **Woman-Owned Small Business**, Solicitation W912BV18R0011: https://www.fbo.gov/spg/USA/COE/DACA56/W912BV18R0011/listing.html

REQUEST FOR INFORMATION - BRAC FY2020 PBR FOLLOW-ON
Department of the Air Force, AFICA - CONUS.
Federal Business Opportunities, FBO-5987, Solicitation FA8903-18-BRAC-RFI-01, 2018

This RFI constitutes market research for developing a viable solicitation that will best communicate the Government's requirements to industry for follow-on BRAC cleanup efforts (NAICS code 562910). The Contracting Officer contemplates a regionalized strategy with one or more competitively awarded hybrid construction and services contracts awarded in each region. The CO is particularly interested in responses from all types of small businesses. This RFI seeks industry feedback on the contemplated acquisition strategy, including vendor experience and capabilities, potential regionalization of installations, and quantitative measurement of remedial optimization. This requirement includes the full range of environmental construction and optimization services necessary to conduct site restoration, continuing the current approach to advance sites to completion within the period of performance (a span of 5 to 10 years depending on the type of work performed), and achieving site-specific objectives as identified in each contract and task order. Responses must be inserted in writable format into the Excel spreadsheet attached to the FedBizOpps notice and submitted via email by 12:00 noon CT on May 11, 2018. https://www.fbo.gov/notices/ad708c1e1c0f0766f85b06b631105858

CONSTRUCT AND COMMISSION GROUNDWATER TREATMENT SYSTEM
Department of the Interior, National Park Service, San Francisco.
Federal Business Opportunities, FBO-5948, Solicitation 140P8618R0013, 2018

This requirement is a 100% small business set-aside, NAICS code 237110, size standard $36.5M. Contractor services are needed to construct and commission a groundwater treatment system for the North Caponier fuel tank, Alcatraz Island, Calif. The North Caponier tank is located on the northwest corner of Alcatraz Island in the San Francisco Bay. The structure sits adjacent to the Bay and was built on a combination of fractured Franciscan bedrock and fill. The general condition of all buildings is poor. Contractor services are required to install a pilot groundwater extraction system to recover water from beneath the North Caponier and to install a pilot groundwater treatment system to batch-process water extracted from the North Caponier for off-haul. The construction range for this project is $250,000-$500,000. Responses must be received by 8:00 PM ET on May 2, 2018. See details on FedConnect at https://www.fedconnect.net/FedConnect/?doc=140P8618R0013&agency=DOI [Note: It might be necessary to copy and paste the URL into your browser for direct access].

DECOMMISSIONING AND DISPOSAL ACTIVITIES FOR THE SM-1 REACTOR FACILITY LOCATED AT FORT BELVOIR, VIRGINIA
Department of the Army, U.S. Army Corps of Engineers, USACE District, Baltimore, MD.
Federal Business Opportunities, FBO-5984, Solicitation W912DR-18-R-0021, 2018

The USACE Baltimore District requests capability statements in response to a potential decommissioning project under NAICS code 562910. Responses will be used by the Government to make appropriate acquisition decisions. No solicitation is available, and the proposed procurement mechanism has not been determined at this time. The solicitation will be for one contract to provide multi-discipline services during a 5-year period of performance in support of a broad range of planning, design, construction, demolition, and support activities related to the decommissioning and disposal of the deactivated SM-1 nuclear power plant and reactor facilities at Fort Belvoir. Capabilities statements must be received by 3:00 PM ET on May 1, 2018.https://www.fbo.gov/spg/USA/COE/DACA31/W912DR-18-R-0021/listing.html

KANSAS ARMY AMMUNITION PLANT (KSAAP) BLDG. 1206 REMEDIATION
Department of the Army, U.S. Army Corps of Engineers, USACE District, Kansas City, MO.
Federal Business Opportunities, FBO-5969, Solicitation W912DQ18R3010, 2018

This solicitation will be set aside for eligible small business concerns under NAICS 562910. Because the former KSAAP is a BRAC facility, a preference for small and small-disadvantaged local businesses will be a part of the evaluation process. In the KSAAP 1200 Area around Building 1206, chromium contamination resulted from casing rework of 105-mm cartridges, a process that involved cleaning the casings with chromic acid. Tasks will include shoring a deteriorating brick wall, removing a portion of the concrete slab, excavating Cr(VI) sub-slab soils, and restoring the concrete slab. The solicitation will be issued on or about May 15, 2018. The subsequent contract will be awarded as a construction contract, magnitude estimated between $800,000 and $1,500,000. https://www.fbo.gov/spg/USA/COE/DACA41/W912DQ18R3010/listing.html

Cleanup News

STATUS REPORT ON REMEDY EFFECTIVENESS: HOOKSTON STATION, PLEASANT HILL, CALIFORNIA
California Regional Water Quality Control Board, San Francisco Bay Region. 142 pp, 2017

As detailed in this report, the Hookston Station parties have implemented several remedial actions to address environmental impacts associated with the presence of TCE and daughter products. Between 2008 and 2010, five in situ chemical oxidation injection events were implemented to remediate B-Zone groundwater. Performance monitoring showed successful distribution of potassium permanganate throughout the targeted treatment area. VOC concentrations in B-Zone wells within the core of the on-site source area are lower than pre-remediation results by up to two orders of magnitude. No additional ISCO injection events are needed. Since the installation in 2009 of a permeable reactive barrier (PRB) containing zero-valent iron to remediate A-Zone groundwater, TCE concentrations in groundwater have decreased significantly. Owing to the PRB's efficacy, only a handful of wells remain above the cleanup standards, and CVOC concentration trends in soil vapor are decreasing. http://geotracker.waterboards.ca.gov/esi/uploads/geo_report/7826408088/SL801392782.PDF

RIVER RAISIN AREA OF CONCERN: NAPL AREA REMEDIATION
Roberts, M., A. Corbin, P. Doody, T. Peters, and C. Robinson.
Proceedings of the Western Dredging Association (WEDA) Dredging Summit & Expo '17, Vancouver, British Columbia, Canada, June 26-29, 2017. p 447-461 + 23 slides, 2017

The NAPL Area is defined as the portion of the River Raisin AOC that contains an apparent NAPL substance and concentrations of PCBs >50 ppm. Remediation activities performed in 2016-2017 within the NAPL Area consisted of dredging sediment containing PCBs to specified depths, followed by placement of cover material in the nearshore area or an engineered cap in other dredged areas. To sequester PCBs remaining in deeper subgrade materials in the NAPL Area, two types of multi-layered engineered caps (A and B) were placed on the post-dredge surface within the navigation channel and transition areas. The difference between Cap A and Cap B was the size of armor stone needed to protect the chemical containment layer. The cap profile consisted of a chemical layer (sand/organoclay mixture) to contain potential PCB transport from underlying materials, overlain by a gravel filter layer, and followed by the armor stone layer. The single chemical contained layer, 12 in deep, comprised 3% minimum organoclay mixed with sand. Decontamination and demobilization of materials and equipment commenced upon completion of dredging and capping.
Paper: https://www.westerndredging.org/phocadownload/2017_Vancouver/Proceedings/7a_2.pdf
Slides: https://www.westerndredging.org/index.php/information/category/281-session-7a-sediment-remediation?download=1505:7a-2-river-raisin-area-of-concern-napl-area-sediment-remediation

FORMER HERCULES INCORPORATED PROPERTY, WEST EDGEMONT DRIVE AND SOUTH RAYON DRIVE, COVINGTON, VIRGINIA
Public Notice: Voluntary Remediation Program (VRP) Activity, VDEQ VRP Case #00648, 2017

The property entered the VRP in December 2013. About 12 acres on the eastern portion of the property served as an unlined landfill for benign wastes (i.e., baled saran, latex solids) from 1965 to 1993. A soil cap installed on the landfill unit prevents rainwater infiltration and degradation. A thick vegetative cover grows over the cap as an additional source of protection against erosion. Historical environmental investigations identified localized carbon tetrachloride (CT) impacts in groundwater on the eastern portion of the property, upgradient of the landfill. Corrective action measures implemented for CT during 2010-2014 included enhanced bioremediation and groundwater monitoring. Based on effective and successful implementation of enhanced bioremediation and the supporting routine and performance monitoring data, the Virginia DEQ terminated post-closure care in April 2015 as CT concentrations declined below the Groundwater Protection Standard (or non-detect). The site characterization report submitted in March 2017 concluded that this property does not pose a risk to human health or the environment provided land use controls are implemented. A Certification of Satisfactory Completion of Remediation will be issued by Virginia DEQ upon completion of the VRP requirements. The property is being considered for future recreational use.
http://www.deq.virginia.gov/Portals/0/DEQ/Land/RemediationPrograms/VoluntaryRemediationProgram/VRP00648.pdf

MODIFIED CORRECTIVE ACTION PLAN (COST PROPOSAL NO. 40) FOR DART MART, HIGHWAY 43 AND JOHNSTON ROAD, MCINTOSH, ALABAMA
Alabama Department of Environmental Management (ADEM), 240 pp, 2017

ADEM requires the implementation of a Corrective Action Plan for remediation of soil and groundwater affected by BTEX, naphthalene, and MTBE after releases of unleaded gasoline from an underground storage tank located at the subject site. This document provides a summary of environmental activities conducted to date at the facility and a detailed description of the proposed methods of site cleanup. Free-product recovery via mobile enhanced multi-phase extraction was conducted in 2003, 2007, and at irregular intervals from 2013-2016. In the modified plan, the first phase of corrective action consists of ozone sparge techniques to provide COC mass reduction. The second phase, natural attenuation, is to commence when contaminant concentrations are at or near the site-specific corrective action limits but do not warrant further ozone sparge efforts. http://www.adem.state.al.us/newsEvents/notices/ngv17/pdfs/11dartmart.pdf

"ZINC ON THE HALF SHELL": SRS PUTS OLD OYSTERS TO NEW USE
U.S. DOE, Office of Environmental Management. 5 Dec 2017

Similar to other legacy facilities, dozens of buildings with old galvanized metal roofs at the Savannah River Site are now leaching zinc that mixes with rain runoff. This runoff presents a potential issue as the rainwater travels from the construction facilities to a roadside drainage ditch leading to a stream. The SRS operations contractor is using oyster shells to address the zinc drainage. Workers piled small rocks and limestone gravel to create check dams that slow the stormwater as it moves through the ditch. They placed a large mound of oyster shells on the upstream side of each dam. The shells draw zinc from the water as it pools before entering the nearby waterway. In another SRS location, the shells have been installed to absorb copper. The installation of four oyster shell check dams at a cost of $7,600 allows the facility to avoid the expense and inconvenience of replacing large portions of structures, including galvanized fencing and metal roofing. https://www.energy.gov/em/articles/zinc-half-shell-srs-puts-old-oysters-new-use

Demonstrations / Feasibility Studies

BIOPOLYMER-ENHANCED REMEDIATION OF COAL TAR IMPACTED SEDIMENT: ECONOMIC ASSESSMENT AND PILOT DATA
Electric Power Research Institute, EPRI Product ID: 3002011440, 2017

A biopolymer-enhanced centrifuge-dewatering process was investigated for remediating manufactured gas plant (MGP) sites in a pilot study of contaminated sediment from the Hudson River in Kingston, New York. The objective of the pilot was to apply commercially available dewatering equipment and assess issues related to scalability. Material handling tests were conducted with a desander and centrifuge at centrifuge feed rates of up to 100 gal/min, with and without biopolymer. The percentage of solids in the feed slurry ranged from 3-33%. Although control (water) trials failed immediately due to the stickiness of fines and hydrocarbons to metal surfaces, rendering impellers and submersible pumps ineffective, biopolymer addition eliminated hydrocarbon/fines agglomeration such that slurry transport of up to 33% solids was efficient and practical. A polyacrylamide surfactant in the decanter centrifuge separated the fines/hydrocarbons from process water based on density. Optimization of centrifuge variables produced reusable biopolymer process water and stackable cake that passed the TCLP test for clean discharge water and a wetter cake. The dewatering system processed 18% solids in the centrifuge feed at 100 gal/min for 20 min (2000 gal of slurry). At the conclusion of the pilot, centrifuge operating parameters were set to obtain clean water, which met discharge water quality requirements. An economic assessment of on-site processing costs showed 48% savings compared to mechanical excavation and gravity dewatering typical of MGP sediment remediation.

DRAFT FINAL REMOVAL ACTION WORKPLAN: BEVERLY HILLS UNIFIED SCHOOL DISTRICT, EL RODEO SCHOOL
California Department of Toxic Substances Control, 247 pp, 2018

Following the removal of a tank of heating oil (Bunker C) in November 2008, free product was observed in the soil at 20-28 ft bgs. Free product removal was conducted using vacuum trucks, bailers, submersible pumps, absorbent socks, and a heat-enhanced surfactant flushing pilot test (July 2016). The flushing technology is referred to as Chemical Enhanced Oil-Phase Recovery, which encompasses flushing modifications such as surfactant chemistry, alkaline modification, shear-thinning polymer, and thermal enhancement. The nature of the Bunker C oil (viscosity, stickiness, and slow migration) makes it extremely difficult to remove. Prior to the pilot test, manual and vacuum truck methods removed ~69 gal of free product at an estimated cost of $540/gal over 7 years. The pilot removed an additional 23 gal at a cost of ~$10,900/gal (total $250,000), demonstrating that the site lithology severely challenged surfactant flushing efficacy. The highest insoluble product hydrocarbon (PHC) recovered was ~14 g of PHC/L-extracted liquids. Based on the estimated residual mass of 23-212 gal the potential cost of additional free product extraction could range from $250,000 to $2,250,000. The pilot study's preparation, implementation, and results are discussed in Appendix C (PDF pages 78-162) of this report.
http://www.envirostor.dtsc.ca.gov/public/view_document.asp?docurl=/public/community_involvement/4010319352/2018%2002%2014%20RAW%20Draft%2DFinal%2Epdf *See more information on this cleanup site at* http://www.envirostor.dtsc.ca.gov/public/profile_report?global_id=60002158

Research

OCCURRENCE AND BEHAVIOR OF PER- AND POLYFLUOROALKYL SUBSTANCES FROM AQUEOUS FILM-FORMING FOAM IN GROUNDWATER SYSTEMS
Hatton, J., C. Holton, and B. DiGuiseppi.
Remediation Journal 28(2):89-99(2018)

Background is presented on aqueous film-forming foam and per- and polyfluoroalkyl substances (PFAS) source characteristics in Part 1 of this paper, including common industrial and consumer PFAS sources. Part 2 discusses chemical properties, sorption and retention parameters, observed transformation properties of PFAS and related compounds, and knowledge gaps. *This paper is* ***Open Access*** *at* https://onlinelibrary.wiley.com/doi/full/10.1002/rem.21552

A REVIEW OF EMERGING TECHNOLOGIES FOR REMEDIATION OF PFASS
Ross, I., J. McDonough, J. Miles, P. Storch, P.T. Kochunarayanan, E. Kalve, J. Hurst, S.S. Dasgupta, and J. Burdick.
Remediation Journal 28(2):101-126(2018)

Remedial technologies—biological, adsorptive, and destructive—are considered for both soils and waters, with challenges to their commercial application outlined. Ex situ technologies for water treatment and treatment train strategies are also discussed. *This paper is* ***Open Access*** *at* https://onlinelibrary.wiley.com/doi/full/10.1002/rem.21553.

EVALUATING PFAS CROSS CONTAMINATION ISSUES
Bartlett, S.A. and K.L. David.
Remediation Journal 28(2):53-57(2018)

Due to the ubiquitous nature of per- and polyfluoroalkyl substances (PFASs) in commonly used sampling materials and personal protective equipment, mitigating the risk of cross contamination can be challenging when planning and executing a PFAS sampling program. This paper describes a conservative approach to PFAS sampling and includes an evaluation of three insect repellent products to determine their suitability for use during PFAS investigation. *This paper is* ***Open Access*** *at* https://onlinelibrary.wiley.com/doi/full/10.1002/rem.21549.

TECHNOLOGY REVIEW AND EVALUATION OF DIFFERENT CHEMICAL OXIDATION CONDITIONS ON TREATABILITY OF PFAS
Dombrowski, P.M., P. Kakarla, W. Caldicott, Y. Chin, V. Sadeghi, D. Bogdan, F. Barajas-Rodriguez, and S.-Y.D. Chiang.
Remediation Journal 28(2):135-150(2018)

An overview of relevant literature summarizes the use of single or combined reagent chemical oxidation processes that offer insight into oxidation-reduction chemistries potentially capable of PFAS degradation. Based on the literature review, bench-scale treatability tests were designed and performed to establish optimal conditions for the formation of specific free radical species, including superoxide and sulfate radicals, using varied combinations of oxidants, catalysts, pH buffers, and heat to assess PFAS treatment by chemical oxidants. *This paper is* ***Open Access*** *at* https://onlinelibrary.wiley.com/doi/full/10.1002/rem.21555.

INTEGRATING TOTAL OXIDIZABLE PRECURSOR ASSAY DATA TO EVALUATE FATE AND TRANSPORT OF PFASS
Casson, R. and S.-Y.D. Chiang.
Remediation Journal 28(2):71-87(2018)

Current commercial laboratory methodologies primarily quantify between 14 and 31 per- and polyfluoroalkyl substances. As an alternative, a total oxidizable precursor assay (TOPA) was developed to quantify measurable concentrations of perfluoroalkyl carboxylates (PFCAs) and perfluoroalkyl sulfonates (PFSAs) after aggressive oxidation to convert perfluoroalkyl acid (PFAA) precursors abiotically into PFCAs. This paper discusses the potential application of this approach to characterize PFAS contamination. *This paper is* ***Open Access*** *at* https://onlinelibrary.wiley.com/doi/full/10.1002/rem.21551.

ELECTROCHEMICAL OXIDATION OF PFOA AND PFOS IN CONCENTRATED WASTE STREAMS
Liang, S., R.D. Pierce Jr., H. Lin, S.-Y.D. Chiang, and Q.J. Huang.
Remediation Journal 28(2):127-134(2018)

In an investigation of the feasibility of coupling electrochemical oxidation (EO) with the use of ion exchange resin (IXR) to address PFOA and PFOS contamination, destruction of PFOA and PFOS by EO was confirmed by the significantly elevated fluoride concentration in the treated IXR solution. EO efficacy also was examined with a Magneli titanium suboxides (Ti_4O_7) phase anode to treat highly concentrated PFASs acquired during IXR regeneration following treatment of PFAS-contaminated groundwater. Key variables that might affect the efficacy of EO treatment of PFASs were explored with solutions spiked with PFOA and PFOS at different concentrations in different batch reactor setups and under various operating conditions. *This paper is* ***Open Access*** *at* https://onlinelibrary.wiley.com/doi/full/10.1002/rem.21554.

FUNGAL BIOTRANSFORMATION OF 6:2 FLUOROTELOMER ALCOHOL
Merino, N., M. Wang, R. Ambrocio, K. Mak, E. O'Connor, A. Gao, E.L. Hawley, R.A. Deeb, L.Y. Tseng, and S. Mahendra.
Remediation Journal 28(2):59-70(2018)

The objectives of this study were to determine the 6:2 FTOH biotransformation potential of two fungal strains, *Gloeophyllum trabeum* and *Trametes versicolor*, and six fungal isolates obtained from sites historically contaminated with PFASs from the use of aqueous film-forming foam. *This paper is* ***Open Access*** *at* https://onlinelibrary.wiley.com/doi/full/10.1002/rem.21550.

ZEROVALENT IRON IN CONJUNCTION WITH SURFACTANTS TO REMEDIATE SEDIMENTS CONTAMINATED BY POLYCHLORINATED BIPHENYLS AND NICKEL
Wu, Y., Y. Wang, X. Huang, S. Chen, X. Zhong, Z. Ni, X. Cai, X. Liu, M.O. Simonnot, and R. Qiu.
Chemosphere 189:479-488(2017)

Scientists investigated the feasibility of two approaches to using zero-valent iron (ZVI) in conjunction with surfactants to remediate sediments contaminated by PCBs and Ni. Approach A was surfactant desorption followed by ZVI treatment. Approach B was a simple mixture of ZVI and sediment in surfactant solution. Results of approach A showed that 65.24% of PCBs and 2.12% of Ni were desorbed by 1% Envirosurf; however, the sequential ZVI-mediated reductive dechlorination was ineffective due to micelle sequestration by high surfactant content, although Ni was almost completely removed. For approach B, See additional information in Y. Wu's dissertation at http://docnum.univ-lorraine.fr/public/DDOC_T_2016_0066_WU.pdf.

MINIMIZING THE HEALTH RISKS FROM HYDROCARBON CONTAMINATED SOILS BY USING ELECTRIC FIELD-BASED TREATMENT FOR SOIL REMEDIATION
Istrate, I.A., D.M. Cocarta, Z. Wu, and M.A. Stoian.
Sustainability 10(1):253(2018)

Lab experiments were conducted using an electric field-based treatment as a possible solution for remediation of soil contaminated with petroleum hydrocarbons and PAHs. Hydrocarbon content declined significantly after 20 d of treatment at 15 V (specific voltage of 1 V/cm), around 50% for TPHs and 46% for PAHs. The data demonstrated to what extent the applied technology ensured an acceptable risk under the same exposure conditions for industrial workers. http://www.mdpi.com/2071-1050/10/1/253/pdf.

REACTIVE TRANSPORT MODELING FOR MOBILIZATION OF ARSENIC IN A SEDIMENT DOWNGRADIENT FROM AN IRON PERMEABLE REACTIVE BARRIER
Jeen, S.-W.
Water 9(11):890(2017)

Arsenic (As) naturally present in native aquifer materials can be released to groundwater through reduction dissolution of As-containing iron oxides. While granular iron permeable reactive barriers (PRBs) can be effective for As treatment in groundwater, As mobilization in sediment downgradient of the PRB is a potential issue due to the reduced geochemical conditions generated by reactions in the PRB. Release of As from sediment downgradient of a proposed iron PRB was studied in lab column experiments, which showed significant As removal from the groundwater by granular iron (from the influent concentration of ~0.7 mg/L to http://www.mdpi.com/2073-4441/9/11/890/pdf

COMPARING MIXED-MEDIA AND CONVENTIONAL SLOW-SAND FILTERS FOR ARSENIC REMOVAL FROM GROUNDWATER
Smiech, K.M., A. Tolsma, T. Kovacs, V. Dalbosco, K. Yasadi, L. Groendijk, and L.L.F. Agostinho.
Water 10(2):119(2018)

Three pilot-scale slow sand filters (SSFs) (flowrate 6 L/h) were tested for their capacity to remove arsenic from groundwater under conditions of 70 µg As(III)/L at 26°C. Two filters were prepared with sand mixed with corrosive iron matter (CIM filter) and iron-coated sand (ICS filter), and the third conventional SSF was used as a reference. Although the ICS filter removed As, the calculated median of the effluent As concentration was 42 µg/L. The CIM filter was able to remove As to below the World Health Organization guideline concentration of 10 µg/L, even for inlet concentrations above 150 µg/L. After 230 days of continuous operation, As concentration in the effluent began to increase, indicating depletion or saturation of the CIM layer. The effluent arsenic concentration, however, never exceeded 50 µg/L during the study. http://www.mdpi.com/2073-4441/10/2/119/pdf.

APPLICATION OF FE-CU/BIOCHAR SYSTEM FOR CHLOROBENZENE REMEDIATION OF GROUNDWATER IN INHOMOGENEOUS AQUIFERS
Zhang, X., Y. Wu, P. Zhao, X. Shu, Q. Zhou, and Z. Dong.
Water 10(1):13(2018)

In a study of enhanced micro-electrolysis for chlorobenzene (CB)-contaminated groundwater remediation, scientists attempted to couple iron-copper bimetal with biochar. Within two series of columns filled with sands of different grain diameters, permeable reactive barriers (PRBs) consisting of iron, copper, and biochar particles were installed to simulate remediation of CB-contaminated groundwater in homogeneous and heterogeneous aquifers. Regardless of the heterogeneity of the porous media, CB concentrations in the effluent from the PRB columns were significantly lower than the natural sandy (control) columns. CB was transported relatively quickly in the heterogeneous porous media, and the average effluent CB concentrations from the heterogeneous porous media were lower than those from homogeneous porous media. Heterogeneity retarded the vertical infiltration of CB, leading to its extended lateral distribution. During the treatment process, benzene and phenol were observed as the products of CB degradation. The two iron, copper, and biochar simulated PRB systems achieved ultimate CB removal efficiency of 61.4% and 68.1%. http://www.mdpi.com/2073-4441/10/1/13/pdf

SOIL WASHING OPTIMIZATION, RECYCLING OF THE SOLUTION, AND ECOTOXICITY ASSESSMENT FOR THE REMEDIATION OF PB-CONTAMINATED SITES USING EDDS
Fabbricino, M., A. Ferraro, V. Luongo, L. Pontoni, and M. Race.
Sustainability 10(3):636(2018)

Researchers investigated the applicability of ethylenediamine-N,N'-disuccinic acid (EDDS) as a washing solution for remediation of Pb-contaminated soil. All aspects of the treatment were optimized, including reuse and final disposal of the spent EDDS solution. Different molar concentrations of the washing solutions and the efficiencies of varying solid/liquid ratio were tested at different pH values. More than 90% of the mobile Pb fraction was removed in about 24 h at pH 6, and soil toxicity was strongly decreased. The regenerated solution exhibited a reduced but still useful extractive capacity. Total Pb extraction was ~50% of the initial value after the first regeneration cycle and almost 20% after the second regeneration cycle. Respirometric tests, conducted using an activated sludge sampled in a municipal wastewater treatment plant, indicated that the spent solutions though not biodegradable exerted no toxic effect on the biomass. Tests on regenerated solutions displayed the same biodegradability as the fresh ones. http://www.mdpi.com/2071-1050/10/3/636/pdf.

INNOVATIVE APPLICATION OF FLUTE™ LINERS FOR CROSS-HOLE HYDRAULIC TESTING IN CRYSTALLINE BEDROCK AQUIFERS
Persaud, Elisha Marie, Master's thesis, University of Guelph, 155 pp, 2017

Rapid groundwater velocities can render crystalline bedrock aquifers particularly vulnerable to contamination. This study examined the installation of flexible, impermeable FLUTe™ liners as a means for assessing cross-hole fracture connectivity in a crystalline bedrock aquifer. The liners were used to generate a new style of hydraulic pulse into the aquifer, with pressure response monitored in a nearby network of open boreholes. Preliminary testing revealed the potential for this method to be used in conjunction with other currently employed borehole liner applications to identify significant groundwater flow paths and estimate inter-well transmissivity. http://atrium.lib.uoguelph.ca/xmlui/handle/10214/10326.

EFFECT OF REACTIVE MATS ON IN-SITU REMEDIATION OF CONTAMINATED MARINE SEDIMENT
De Gisi, S., F. Todaro, and M. Notarnicola.
Procedia Environmental Science, Engineering and Management 4(1):17-22(2017)

Among remediation options for contaminated sediments, in situ capping appears to be an approach that is less expensive and disruptive and more durable. Active capping involves the use of chemically reactive materials (i.e., activated carbon, apatite, zeolite, organoclay) that sequester and/or degrade sediment contaminants to reduce their mobility, toxicity, and bioavailability. The performance of different types of active materials tested in recent active capping studies is reviewed with a special focus on reactive mats. Reactive mats consist of a reactive layer containing one or more neutralizing or otherwise reactive materials confined between two permeable geotextile layers. http://www.procedia-esem.eu/pdf/issues/2017/no1/3_De%20Gisi_17.pdf.

DISTRIBUTED MONITORING OF SOIL AND GROUNDWATER DURING IN-SITU THERMAL REMEDIATION USING FIBER OPTIC SENSORS
Alemohammad, H., A. Azhari, and R. Liang.
Biotech, Biomaterials and Biomedical: TechConnect Briefs 3:258-260(2017)

A network of distributed fiber optic sensors was implemented to monitor the distribution of soil and groundwater temperature and the level of groundwater in several in situ thermal remediation projects. The unique advantages of fiber optic was leveraged through the development of transducers for distributed sensing of temperature and pressure, which are critical performance parameters for assessing the efficiency of any in situ thermal remediation process. https://briefs.techconnect.org/wp-content/volumes/TCB2017v3/pdf/835.pdf.

General News

IN-SITU REMEDIATION OF ARSENIC-CONTAMINATED SITES
Bundschuh, J., H.M. Hollaender, and L.Q. Ma (eds).
CRC Press, Boca Raton, FL. ISBN: 9781138747753, 208 pp, 2018

This text provides scientific background, case studies, and future perspectives of in situ arsenic remediation technologies for soils and groundwater at geogenic and anthropogenic As-contaminated sites. Natural arsenic (arsenate and arsenite) as well as organic arsenic compounds are discussed. Technologies covered include geochemical, microbiological, and plant-based ecological solutions for arsenic remediation. *View the table of contents at* https://www.crcpress.com/In-Situ-Remediation-of-Arsenic-Contaminated-Sites/Bundschuh-Hollander-Ma/p/book/9781138747753.

EMERGING CONTAMINANTS SUMMIT, MARCH 6-7, 2018, WESTMINSTER, CO

The 2018 Emerging Contaminants Summit focused on the latest developments in the detection, fate and transport, risk assessment, treatment, and regulation of emerging contaminants, with a particular emphasis on per- and polyfluorinated compounds (e.g., PFOS, PFOA) and 1,4-dioxane. Session topics also included managing emerging contaminants in drinking water, wastewater and stormwater; 1,2,3-trichloropropane (TCP) and N-nitrosodimethylamine (NDMA); U.S. Geological Survey research highlights; trace organics in biosolids; and bisphenols, EDB, norbornene flame retardants, and insecticides. Presenter biographical information and abstracts are posted with the program agenda at http://www.contaminantssummit.com/.

BROWNFIELDS ROAD MAP TO UNDERSTANDING OPTIONS FOR SITE INVESTIGATION AND CLEANUP, SIXTH EDITION
U.S. EPA, Office of Land and Emergency Management, Washington, DC.
EPA 542-R-17-003, 86 pp, 2017

This document provides a general outline of the steps in the investigation and cleanup of brownfield sites and introduces brownfields stakeholders to technologies and resources available to them. The Road Map provides valuable information for stakeholders typically involved in or affected by redevelopment of brownfields, whether through public projects, private development, or public-private partnerships. This edition builds upon the streamlined approach of the fifth edition, providing updated content and guidance on the brownfields remediation process. New features include an updated list of "spotlights" that highlight and describe key issues. This edition offers updated information on brownfields funding and best management practices, with guidance on how to incorporate greener cleanups and new standards into the cleanup process. https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100TFI7.txt

REMEDIATION JOURNAL, SPRING 2018

Per- and polyfluorinated substances are the focus of the spring 2018 issue of *Remediation Journal*, and all the papers are Open Access for an undefined period of time. https://onlinelibrary.wiley.com/toc/15206831/28/2

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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