

Technology Innovation News Survey

Entries for January 1-15, 2018

Market/Commercialization Information

SPECIAL NOTICE: SOURCES SOUGHT, START V

U.S. EPA, Office of Acquisition Management, Region V, Chicago.
Federal Business Opportunities, FBO-5929, Solicitation 68HE0518R0005, 2018

The purpose of this sources sought is to identify potential small businesses with the capability to perform the requirements defined in the draft Statement of Work posted on FedConnect at <https://www.fedconnect.net/FedConnect/240c-68HE0518R0005Sagency=EPA> (Note: It might be necessary to copy and paste the URL into your browser for direct access). The NAICS code for this requirement is 541620 (Environmental Consulting Services), size standard \$15M. Most of the technical support required is applicable to nationally consistent advisory assistance to EPA's on-scene coordinators and other federal officials implementing EPA's responsibilities under the national response system for the Superfund Technical Assessment and Response Team (START) class of contracts. These services primarily support the Emergency Response Branch in the Superfund Division in EPA Region 4 (AL, FL, GA, KY, MS, NC, SC, TN) and EPA Region 5 (IL, IN, MI, MN, OH, WI). Interested small business concerns are invited to submit a capability statement (20 pages max) for one Region or for both, but separately for each Region. Responses must be received via email no later than 2:00 PM CT on March 19, 2018. <https://www.fbo.gov/spg/EPA/OAM/MISC-101/68HE0518R0005/listing.html>

GREAT LAKES ARCHITECT ENGINEER SERVICES (GLAES II)

U.S. EPA, Office of Acquisition Management, Region V, Chicago, IL
Federal Business Opportunities, FBO-5927, Solicitation SOL-R5-17-00006, 2018

This solicitation is issued as a request for Standard Form 330 Architect-Engineer qualification packages. The GLAES contract will provide professional A-E services to support the needs of EPA's Great Lakes National Program Office for contaminated sediment design activities, habitat restoration design/evaluation support, and contaminated sediment remedial oversight. This requirement is a total small business set-aside under NAICS code 562910, size standard 750 employees. EPA intends to award one IDIQ contract with a maximum contract value of \$25M and a 5-year ordering period. SF330 packages must be submitted via FedConnect and received no later than 4:30 PM CT on March 20, 2018. Monitor FedConnect for updates. <https://www.fbo.gov/spg/EPA/OAM/MISC-101/SOL-R5-17-00006/listing.html>. Additionally, full and open competition for GLAES II under Solicitation SOL-R5-17-00007 (SF330s due March 22) is posted at <https://www.fbo.gov/spg/EPA/OAM/MISC-101/SOL-R5-17-00007/listing.html>.

2018 ERDC BROAD AGENCY ANNOUNCEMENT (BAA)

U.S. Army Corps of Engineers, USACE, Fort Belvoir, IL
Federal Business Opportunities, FBO-5916, Solicitation W912H2-18-BAA-01, 2018

The latest BAA issued by the U.S. Army Engineer Research and Development Center (ERDC) lists both general and specific R&D needs areas applicable to environmental investigation and cleanup as identified by the ERDC member laboratories:

- Geotechnical and Structures Lab: Development of land, air, or waterborne geophysical methods for characterizing hazardous waste sites.
- Environmental Lab: Research that supports contaminated site characterization, assessment, and remediation.
- Construction Engineering Research Lab: Electro-osmotic technology for water and chemical containment (e.g., removing hazardous contaminants from groundwater) and bioelectrochemical systems (e.g., microbial fuel cells that oxidize organic contaminants while generating electrical current).
- Cold Regions Research and Engineering Lab: Environmental fate and transport geochemistry.

The BAA is open until January 31, 2019, or until it is superseded. Proposals can be submitted at any time. <https://www.fbo.gov/spg/USACE/COE/329/W912H2-18-BAA-01/listing.html>

LONG TERM MANAGEMENT/LAND USE CONTROL AT DOBBINS AIR RESERVE BASE GEORGIA

Department of the Air Force, AFICA - CONUS, Dobbins Air Reserve Base, GA
Federal Business Opportunities, FBO-5915, Solicitation FA9903-18-R-0019, 2018

This requirement is a 100% small business set-aside, NAICS code 562910 (Remediation Services), size standard 750 employees. The 772 ESS/PKS intends to award a single firm-fixed-price contract to conduct long term management/land use control inspection and assessment at the former McClellan Air Force Base, Georgia. The period of performance will be 12 months (28 March 2018 to 27 March 2019). LTM/LUC activities will encompass eight sites at the base: Fast Base Landfill F001; closed earthen fire training pit F001; fire training pit F003; AV/GAS Sludge Burial Site A, DP005; Fuel Sludge Burial Site B, DP006; sediments contaminated with pesticides, heavy metals, and PCBs in Big Lake, OT004; sediments contaminated with PCBs, heavy metals, and pesticides in Little Lake, OT007; and former fuel transfer lines, ST008. Samples will be analyzed for fuels, metals, VOCs, and SVOCs. Proposals are due by 1:00 PM CT on March 1, 2018. <https://www.fbo.gov/spg/USACE/COE/329/W912H2-18-BAA-01/listing.html>

Cleanup News

PEERLESS PLATING, MUSKOGON, MI

Fiscal Year 2016 Federal Superfund Legislative Report. Michigan Department of Environmental Quality (MDEQ), 467-477(2017)

The Peerless Plating Company site, about one acre in size, is located within a mix of light industrial and residential land uses. Electroplating operations conducted at the facility (1937-1983) included copper, nickel, chromium, cadmium, and zinc plating in processes that required the use of toxic, reactive, corrosive, and flammable chemicals. U.S. EPA conducted emergency removal actions in 1983 and 1991. The 1992 ROD called for building demolition, groundwater pump and treat for VOCs followed by chemical precipitation of inorganics, soil vapor extraction, and excavation and stabilization of inorganics. Construction and startup of these remedies was completed in 2001. In 2012 EPA agreed to undertake, with MDEQ approval, a separate remedial action to include in situ soil treatment and installation of a permeable reactive barrier (PRB) along Little Black Creek to address the remaining cadmium source-area contaminated soils. Results of a pilot test of in situ chemical reduction (ISCR) in 2014 were positive, and both agencies agreed to implement the full-scale remedy in July 2015. Injections took place from mid-August to early October 2015, and the ISCR and PRB remedies operated throughout 2016. At least four years of quarterly groundwater sampling will be conducted to evaluate the effectiveness of the remedy. http://www.michigan.gov/documents/dof/dof_fed_fy16_superfund_legislative_report_326627_7.pdf. See additional information in the site's fourth 5-year review (2017) at <https://semspub.epa.gov/scrd/document/05534560>.

SITEWIDE ENVIRONMENTAL MONITORING SEMIANNUAL PROGRESS REPORT FOR THE YOUNG-RAINEY STAR CENTER, DECEMBER 2016 THROUGH MAY 2017

LMS/PI/N02159, 518 pp, 2017

The STAR Center is owned by the Pinellas County [Florida] Industrial Development Authority, but DOE is responsible for remediation activities at the site. DOE developed and manufactured components for the nation's nuclear weapons program while the owned facility, and during those operations the groundwater became contaminated with TCE, DCE, VC, and 1,4-dioxane. To address this contamination, bioinjection of emulsified vegetable oil and the microorganism *Dehalococcoides mccartyi* was conducted in the dissolved-phase plumes on the STAR Center property in October and November 2014, on three offsite properties in February 2015 and February/March 2017, and in the horizontal wells beneath Building 100 in November 2017. Monitoring to evaluate the performance of these actions was initiated with the March 2015 sampling event and is ongoing. https://www.lm.doe.gov/Pinellas/N02159_PIN_doe16-may17.pdf

FAIRCHILD CONTROLS FACILITY (MANHATTAN BEACH, WEST COAST BEACH)

Whitaker, R.
Meeting of the Groundwater Quality Committee of the Board of Directors, Water Replenishment District of Southern California, April 11, 2017. Environmental Sites Review: 8-9(2017)

The 9-acre Fairchild Controls facility formerly operated as a parts manufacturer for the aerospace industry (1955-1992). Cleaning/degreasing operations resulted in the release of PCE and TCE, and a chrome acid storage tank/clarifier in an on-site plating shop was a source of Cr(VI). Until the 1980s, waste solvents were placed in an underground waste oil sump, which leaked and was removed in 1988. The site was redeveloped into the current Manhattan Gateway Shopping Center in 1999. Groundwater impacts are present in three water-bearing zones: a shallow zone (65-100 ft bgs), deep zone (100-120 ft bgs), and lower gage (130-150 ft bgs). Site constituents have not been detected in area production wells (the closest located ~2.4 miles east). Multiple treatments have been implemented over the years to address the site's soil and groundwater contamination: Excavation (1996); SVE #1 (1998-2000); groundwater P&T (1999-2000); SVE #2 (2004-2011); in situ calcium polysulfide (CPS) pilot for Cr(VI) in groundwater #1 (2005); in situ CPS/EVO in groundwater #2 on & off site (2008); SVE #3 off-site pilot (2010-2011); in situ cheese whey pilot (reductive dechlorination) in groundwater #3a (2014 & 2015); and in situ groundwater recirculation #3b pilot (2016). <http://www.wrl.net/sites/default/files/haart-document/170411%20GW%20Qmtr%20Rpt.pdf>. Follow up on monitoring results at http://oestracrkr.waterboards.ca.gov/profile_report323337110/W0681010032392.

CLEAN WATER ACT SECTION 401 WATER QUALITY STANDARDS CERTIFICATION FOR LOCKHEED MARTIN BEAUMONT SITE 2 LABORDE CANYON REMEDIATION PROJECT, CITY OF BEAUMONT, OVERTSIDE CALIFORNIA

Santa Ana Regional Water Quality Control Board, SARWQCB Project 332016-41, 8 pp, 17 Jul 2017

In this letter, the Santa Ana RWQCB certified and defined the conditions for a project to construct a biobarrier treatment system to remove perchlorate from contaminated groundwater in Laborde Canyon, which will prevent the perchlorate-contaminated groundwater from migrating off site and flowing into the San Jacinto River and San Jacinto Groundwater Basin. Three types of material—limestone gravel, wood chips, and a long-acting carbon substrate—will be placed upon excavation of a trench measuring ~280 ft in length and a minimum depth of ~29 ft measured at canyon center. Biobarrier operation and maintenance will include replenishment of the organic carbon substrate when geochemical and chemical sampling data indicate that the carbon is limiting perchlorate biodegradation. Injection ports installed during biobarrier construction will be used to inject diluted long-acting carbon substrate directly into the biobarrier or to extract groundwater from one port while the groundwater is simultaneously injected into adjacent ports to recirculate diluted carbon substrate within the barrier. https://www.waterboards.ca.gov/santana/water_issues/programs/401_certification/docs/wqc/2017/lockheed_martin_beaumont_site_2_laborde_canyon_remediation.pdf.

ST. JULIENS CREEK ANNEX, CHESAPEAKE, VIRGINIA

Secretary of Defense Environmental Award Fiscal Year 2016: Environmental Restoration - Installation, 7 pp, 2017

St. Juliens Creek Annex (SJCA) began operations as a naval facility in 1849. Of 59 potentially contaminated areas identified since the SJCA was listed on the NPL in 2000, 56 of the areas have been determined to require no further action. Only three installation restoration sites are currently active in the restoration program. The award recognizes the SJCA for its accelerated environmental cleanup accomplishments and positive community relationships. This fact sheet describes the facility's remedial action optimization efforts (including vapor intrusion monitoring) and implementation of innovative technologies, such as enhanced reductive dechlorination of chlorinated VOC constituents via emulsified vegetable oil injections and real-time high-resolution characterization tools. http://greenfleet.fodlive.mil/files/2017/03/2_Nomination-Narrative_SJCA_FY16_v.02.pdf.

Demonstrations / Feasibility Studies

SUCCESSFUL BIOREMEDIATION OF 1,4-DIOXANE AND 1,2-DICHLOROETHANE IN A DILUTE PLUME

Chu, M.-Y., J. P. Bennett, and M. Einarson.
2017 GRA Conference, October 3-4, 2017, Sacramento, California. 21 slides, 2017

The feasibility of concurrent treatment of all contaminants via the aerobic cometabolic biodegradation (ACB) process was demonstrated in California at the former McClellan Air Force Base. Primary substrates HD10 propane and oxygen were added to recirculated groundwater to stimulate in situ aerobic cometabolic biodegradation of the indigenous microbial population. Results show that dioxane can be treated to concentrations < 1 µg/L and co-contaminants TCE, 1,2-DCA, and 1,1-DCE can be concurrently treated to their respective analytical method detection limits of 0.23, 0.18, and 0.2 µg/L. The degrading activity lasted for more than two weeks without the addition of primary substrates. Treatment efficiencies were contaminant specific, ranging from 90-99%. This presentation shares insights gained from the demonstration field test along with descriptions of in situ ACB implementation under various large dilute plume scenarios. Potential applications, including different suites of contaminants, various types of substrates, enhanced natural attenuation, and mass flux management, are also identified. <https://www.grac.org/files/1161/download>.

PILOT TEST WORK PLAN, HIBCO SITE, 12620 CERISE AVENUE, HAWTHORNE, CALIFORNIA

Los Angeles Regional Water Quality Control Board (RWQCB), 44 pp, 2017

Previously part of a facility that manufactured latex and foam rubber products (Hibco Corp.), the site now is a parking lot for impounded vehicles. In response to the RWQCB request to begin groundwater remediation to address VOCs, Cr(VI), and 1,4-dioxane, the remedial design and trap that acted as a source for these impacts, the proposed pilot test follows the completion in 2016 of soil excavation activities in the sand trap vicinity. The pilot objectives are to evaluate the effectiveness of sodium persulfate to treat chlorinated hydrocarbons in groundwater beneath the site; obtain site-specific information regarding injection pressure, radius of influence, and rate of persulfate delivery; and determine Cr(VI) mobility under oxidative conditions. This work plan discusses site history and conditions, describes the remedial design, and provides as an appendix a vendor guide on the use of alkaline-activated Klorox® persulfate. See the work plan at https://oestracrkr.waterboards.ca.gov/profile_report323337110/W0681010032392 and visit http://oestracrkr.waterboards.ca.gov/profile_report323337110/W0681010032392 for follow-on reports.

IMPORTANCE OF UNUSUAL DICHLOROETHYLENE ISOMER RATIOS AND SEWER LEAKAGE TO AN IN SITU REMEDIATION

Studer, J.E.
CleanUp 2017: Proceedings, 7th International Contaminated Site Remediation Conference, 10-14 September, Melbourne, Australia, p 261-262, 2017

Outcomes from a field pilot test of Biogeochemical Reductive Dechlorination (BIRD) for in situ groundwater treatment strayed significantly from general expectations. The subject site is located in a congested urban area on the Gulf Coast of Florida, overlying a freshwater chlorinated VOCs plume that affects 1.5 hectares of variably weathered limestone bedrock to a depth of over 40 m below grade. The goal was to reduce, at the lowest practical cost, the summed groundwater concentration of TCE and the transformation product isomers of DCE plus VC from ~5,000 µg/L to < 20 µg/L. Subsequent careful review of pilot performance data and insights obtained from a bench-scale study led to identification of previously unsuspected features that would have indicated the incompatibility of the technology with the remedial goal. First, natural biotransformation of TCE to DCE isomers occurs with the documented groundwater concentration ratio of trans-1,2 DCE to cis-1,2 DCE often exceeding 1 and occasionally approaching 4.5. These values deviated significantly from the typical value of ~0.1 and suggest the presence of special partial dechlorinators. Second, unsuspected sewer leakage introduced nitrogen to the alluvium, resulting in maximum detected NO₃ of 120 mg/L in shallow bedrock. Following discovery and repair of the sewer break, in-depth analysis aided by bench study insights suggested that BIRD can be a good match for the bedrock if an improved reagent distribution process is implemented. http://www.cleantechconference.com/wp-content/uploads/2017/03/CleanUp_2017_Proceedings_1406-Res.pdf

1,4-DIOXANE SOIL REMEDIATION USING ENHANCED SOIL VAPOR EXTRACTION: I. FIELD DEMONSTRATION

Hinchee, R.E., P.R. Dahlen, P.C. Johnson, and D.R. Burris.
Groundwater Monitoring & Remediation [Published online 11 Jan 2018 prior to print]

Although some 1,4-dioxane can be removed from vadose zone pore water by conventional soil vapor extraction (SVE), remediation is typically inefficient. SVE efficiency is hindered by low Henry's Law constants at ambient temperature and redistribution to vadose pore water if SVE wells pull dioxane vapors across previously clean soil. Based on the hypothesis that heated air injection and more focused SVE extraction (XSVE) could increase the efficiency of dioxane removal from the vadose zone, a new process was pilot tested at the former McClellan Air Force Base, where the four peripheral heated air injection wells of the XSVE system surrounded a 6.1 m x 5.1 m x 9.1 m deep treatment zone with a central vapor extraction well. Soil temperatures reached as high as ~90°C near the injection wells after 14 months of operation and flushing of the treatment zone with ~20,000 pore volumes of injected air. Results post treatment showed dioxane reductions of ~94% and ~45% decrease in soil moisture. See additional information in slides at http://www.contaminantstudies.com/images/presentations/3_Roblinchee.pdf.

FEBRUARY 2017 SEMI-ANNUAL GROUNDWATER MONITORING & PILOT TEST OPERATION REPORT, LAUN-DRY SUPPLY COMPANY, 1503 12TH STREET NW, ALBUQUERQUE, NEW MEXICO

New Mexico Environment Department, Albuquerque, 291 pp, 2017

Developed around 1959, the property has been used as a laundry and dry cleaning supply distribution facility. To address PCE and daughter products TCE, cis-1,2-DCE, and trans-1,2-DCE in groundwater at the site, an in situ bioremediation (SVE) pilot is being observed in 3 wells and a soil vapor extraction (SVE) pilot is underway in 3 wells. The site contractor operates the SVE system intermittently in support of the pilot test. The SVE pilot system has removed ~747 pounds of PCE and 18.5 pounds of TCE in December 2013. Vapor concentrations in all wells have decreased by more than 99.9% since that time. Installation of a permeable reactive barrier is now being planned. [https://clm.doe.gov/water/resources/translator.php?file=PH10E\(799\)W41q\(CS86a18p\)74w\(C\)3s37p\(BkX7r\)7mm10117dga3D\(XY51TRB\)wqkBSu1Ruk4QVxgZ7wG6S65V7I0E_pdxplus_25_sides](https://clm.doe.gov/water/resources/translator.php?file=PH10E(799)W41q(CS86a18p)74w(C)3s37p(BkX7r)7mm10117dga3D(XY51TRB)wqkBSu1Ruk4QVxgZ7wG6S65V7I0E_pdxplus_25_sides)
<https://www.files.wordpress.com/2017/09/laun-dry-subsurface-statement-nlan.pdf>. Additional information: <https://www.env.nm.gov/water/contaminants/2016/07/25/Supplemental-Final-Site-Invest-and-SAR-Report-Complete.pdf>.

Research

RATIOMETRIC GAS REPORTING: A NON-DISRUPTIVE APPROACH TO MONITOR GENE EXPRESSION IN SOILS

Cheng, H.-Y., C.A. Masiello, I. Del Valle, X. Gao, G.N. Bennett, and J.J. Silberg. ACS Synthetic Biology [Published online 24 Jan 2018 prior to print]

A new ratiometric gas reporting method is described for non-disruptively monitoring gene expression within hard-to-image environmental matrices. With this approach, ethylene is continuously synthesized by ethylene-forming enzyme to provide information on viable cell number, and methyl bromide is conditionally synthesized by placing a methyl halide transferase gene under the control of a conditional promoter. Ratiometric gas reporting enables the creation of *Escherichia coli* biosensors that report on acylhomoserine lactone (AHL) autoinducers used for quorum sensing by gram-negative bacteria. The biosensors can be used in soils for non-disruptive monitoring of AHLs synthesized by *Rhizobium leguminosarum* and degraded by *Bacillus thuringiensis*. This new reporting approach can also be used in *Shewanella oneidensis*, a bacterium that lives in sediments. See additional information in the Rice University news release at <http://news.rice.edu/2018/02/01/Two-stage-gas-sensors-reports-on-soil-dynamics>.

ELECTROANALYTICAL TECHNIQUES FOR THE QUANTIFICATION OF TECHNOLOGY-CRITICAL ELEMENTS IN ENVIRONMENTAL SAMPLES

Cobelo-García, A. and M. Filella. Current Opinion in Electrochemistry 3:78-90(2017)

There is an increasing demand for analytical techniques that are able to measure technology-critical elements (rare earths), a set of elements increasingly used in technological applications (e.g., Pt-group elements, Nb, Ta, Te, In, Ga, Ge, Ti). Recent advances in voltammetric methods for determining these elements in environmental media are reviewed, mainly covering results published since 2004. Methods ready to be applied, along with promising methods in need of further development, are identified and critically evaluated. The effect of these elements on human health and the environment has yet to be studied. <https://archive.wuolfe.unige.ch/issue-36/26/ATTA/CHM/FNT/1>

TREE SAMPLING AS A METHOD TO ASSESS VAPOR INTRUSION POTENTIAL AT A SITE CHARACTERIZED BY VOC-CONTAMINATED GROUNDWATER AND SOIL

Wilson, J.L., M.A. Jimsy, J.L. Scahill, S. Schmitt, and J.G. Burken. Environmental Science & Technology 51(18):10369-10378(2017)

Regression models were developed to assess the relation between PCE concentrations in 500-plus tree-core samples with PCE concentrations in 50 groundwater and 1000 soil samples collected from a PCE-contaminated Superfund site. Results from sample analysis using gas chromatography indicate that *in planta* concentrations are significantly and positively related to PCE concentrations in groundwater samples collected at depths < 20 m and in soil samples. A sampled tree 30 cm in diameter indicated soil concentrations at depths < 6 m over an area of 700-1600 m², the volume of a typical basement. The findings illuminate the potential of the tree sampling method for detecting contamination at shallow depths at sites with suspected vapor intrusion issues.

OPTIMIZATION MODEL FOR THE DESIGN OF MULTI-LAYERED PERMEABLE REACTIVE BARRIERS

Polonski, M., K. Pawluk, and I. Rybka. IOP Conference Series: Materials Science and Engineering 245:1-8(2017)

Barrier dimensions are the most important parameters for permeable reactive barrier (PRB) design. The barrier must be long enough to treat the entire width of the plume (dimension perpendicular to groundwater flow) and should extend to and be keyed into an impermeable layer. The optimal thickness of a PRB should provide a residence time appropriate for reducing the concentration of contaminants to the desired effluent concentration. PRB design is accomplished using numerical methods or simulators, which are useful to predict the scenarios and evaluate the resulting groundwater flow systems to specific site conditions; however, numerical methods are complicated and may have significant errors if the discretization is too coarse or is incorrectly aligned. This paper describes a simple conceptual model of a one-approach optimization method for multi-layered PRB design. The required thicknesses of activated carbon, zeolite, and zero-valent iron (with consideration of their respective cost) were calculated using two different algorithms. This simple model can be used for rapid preliminary barrier design and cost calculations. <http://inscience.iop.org/article/10.1088/1757-8998/245/1/072017.pdf>

LEAD AND ANTIMONY SPECIATION IN SHOOTING RANGE SOILS: MOLECULAR SCALE ANALYSIS, TEMPORAL TRENDS AND MOBILITY

Tilmon, T. SERDP Project ER-1770, 98 pp, 2017

The objective of this project was to provide a detailed analysis of the changes in lead (Pb) and antimony (Sb) speciation that occur over time as bullet fragments weather in shooting range impact-berm soils. Most bullet alloys are composed of about 90% Pb with up to 5% Sb and lesser amounts of Cu, Ni, Zn, and other metal(loid)s. Bullet fragments found in berm soils associated with training activities are highly susceptible to oxidation and weathering processes that can generate mobile and bio-available forms of metal(loid)s, which calls for improved understanding of how the speciation of the key metal(loid)s changes under typical soil/geochemical conditions. <https://www.serdp-estrp.org/content/download/46516/435314/file/ER-177006-20Final96-20Report.pdf>

PROTONEMA OF THE MOSS *FUNARIA HYGROMETRICA* CAN FUNCTION AS A LEAD (Pb) ADSORBENT

Itoaga, M., M. Hayatsu, M. Sato, Y. Tsuboi, Y. Kato, K. Toyooka, S. Suzuki, S. Nakatsuka, et al. PLOS One 12(12):0189726(2017)

Phytoremediation and biosorbent filtration have been investigated for recovering heavy metals for recycling and mitigating metals toxicity. The filamentous protonemal cells of the moss *Funaria hygrometrica* can hyperaccumulate Pb up to 74% of their dry weight when exposed to solutions containing divalent Pb. Energy-dispersive X-ray spectroscopy revealed that Pb is localized to the cell walls, endoplasmic reticulum-like membrane structures, and chloroplast thylakoids, suggesting that multiple Pb retention mechanisms are operating in living *F. hygrometrica*. The main Pb-adsorbing compartment was the cell wall, and prepared cell-wall fractions could also adsorb Pb. Nuclear magnetic resonance analysis showed that polysaccharides composed of polygalacturonic acid and cellulose probably serve as the most effective Pb-binding components. The adsorption abilities were retained throughout a wide range of pH values, and bound Pb was not desorbed under conditions of high ionic strength. The moss is also highly Pb tolerant. This paper is **Open Access** at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0189726>.

TUNABLE NANOCOMPOSITE MEMBRANES FOR WATER REMEDIATION AND SEPARATIONS

Hernandez Sierra, Sebastian, Ph.D. dissertation, University of Kentucky, 281 pp, 2017

Hydrogel-membrane systems with Fe/Pd nanoparticles were studied throughout the reduction of TCE. The work demonstrated an effective improvement in TCE reduction by variation of the supporting membrane types and functionalization (polymerization and nanoparticle synthesis) processes. The TCE normalized dechlorination rates were 3 times greater for hollow fiber membranes and 8 times greater for sponge-like flat sheet membranes than previous studies. For membrane-supported Fe/Pd nanoparticles by redox functionalization, the dechlorination rates were similar to previous works in flat sheet membranes, and for the redox-polymerized hydrogel, the dechlorination rates achieved the highest results: 1.3 times the rates of solution-phase nanoparticles and 10 times the rate values of the membranes. All supports showed nonsignificant nanoparticle loss (up to 1%). Up to 80% of reduction was achieved within 2 hours, with chloride production near to stoichiometric values (3:1), demonstrating absence of intermediates. http://uknowledge.uky.edu/eme_etds/72

TOWARD BIOREMEDIATION OF METHYLMERCURY USING SILICA ENCAPSULATED *ESCHERICHIA COLI* HARBORING THE *MER* OPERON

Kane, A.L., B. Al-Shayeb, L.V. Holec, S. Rajan, N.E. Le Mieux, S.C. Heinsch, S. Psarska, K.G. Aukema, C.A. Sarkar, E.A. Nater, and J.A. Gralnick. PLoS One 11(1):0147036(2016)

To facilitate remediation of both organic and inorganic forms of mercury, *Escherichia coli* were engineered to harbor a subset of genes (*merTPAB*) from the mercury resistance operon. Protein products of the *mer* operon enable transport of mercury into the cell, cleavage of organic C-H bonds, and subsequent reduction of ionic mercury to the less toxic elemental form, Hg(0). *E. coli* containing *merTPAB* were then encapsulated in silica beads, resulting in a biological-based filtration material. Performing encapsulation in aerated mineral oil yielded silica beads that were smooth, spherical, and similar in diameter. Following encapsulation, *E. coli* containing *merTPAB* retained the ability to degrade methylmercury and performed similarly to non-encapsulated cells. This paper is **Open Access** at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0147036>.

EVALUATION OF SURFACTANT PERFORMANCE IN IN SITU FOAM FLUSHING FOR REMEDIATION OF DICHLORODIPHENYLTRICHLOROETHANE-CONTAMINATED SOIL

Ly, C., J. Chen, and X. Wang. International Journal of Environmental Science and Technology 14(3):631-638(2017)

A study was conducted to select the appropriate surfactant for remediation of DDT-contaminated soil using an in situ foam-flushing technique. Performance of the nonionic surfactants polyethylene glycol octyl phenyl ether, polysorbate, and polyoxyethylene lauryl ether was investigated, as well as the anionic surfactant sodium dodecyl sulfate, with respect to foam static characteristics, DDT solubility enhancement, adsorption loss onto soil, and DDT desorption from contaminated soil during foam flushing. Polyethylene glycol octyl phenyl ether delivered better foamability and stability, relatively high DDT solubilization, and the highest contaminant desorption efficiency from soil via foam flushing. The desorption efficiency of DDT by the different surfactants was largely influenced by foam static characteristics and solubility enhancement of DDT rather than adsorption loss onto soil, which indicated that foam static characteristics and surfactant solubilization are key criteria for selection of high-performance foam surfactant. See previous work on this project at <http://or.nrc.gov/biosteam/0001903/5/250201/1/000014290295.PDF> and <http://or.nrc.gov/biosteam/0001903/5/250201/1/000014290295.PDF>

REMEDICATION OF DIESEL CONTAMINATED SOIL BY TWEEN-20 FOAM STABILIZED BY SILICA NANOPARTICLES

Karthick, R.A. and P. Chaitopadhyay. International Journal of Chemical Engineering and Applications 8(3):194-198(2017)

To analyze the efficiency of applying nanoparticle-stabilized nonionic surfactant foams for remediation of diesel-contaminated soil, stable foams were produced from dispersions of hydrophilic and hydrophobic silica nanoparticles with the nonionic surfactant Tween-20. Tween-20 foam stabilized with 0.5 wt% hydrophobic silica nanoparticles achieved 78% maximum diesel oil removal efficiency, much higher than was obtained for Tween-20 foam stabilized with 0.5 wt% hydrophilic silica nanoparticles. The Tween-20 surfactant solution alone provided only 42% maximum oil removal efficiency. <http://www.ijcea.org/vol8/ISS-3-1004.pdf>

ADVANCES IN SULFIDATION OF ZEROVALENT IRON FOR WATER DECONTAMINATION

Li, J., X. Zhang, Y. Sun, L. Liang, B. Pan, W. Zhang, and X. Guan. Environmental Science & Technology 51(23):13533-13544(2017)

Sulfidation has been shown to improve contaminant sequestration by zero-valent iron (ZVI). This review summarizes developments in ZVI sulfidation by describing the technology's progress through synthesis, characterization, and water remediation and treatment. Under most circumstances, sulfidation can enhance sequestration of various organic compounds and metal(loid)s by ZVI to varying extents. S-ZVI reactivity toward contaminants is strongly dependent on S/Fe molar ratio, sulfidation method, and solution chemistry. Sulfidation also can improve the selectivity of ZVI toward a targeted contaminant over water under anaerobic conditions. This summary includes a description of the mechanisms of sulfidation-induced improvement in contaminant sequestration by ZVI and identifies current knowledge gaps and future research needs of S-ZVI for environmental application.

CALCIUM POLYSULPHIDE, ITS APPLICATIONS AND EMERGING RISK OF ENVIRONMENTAL POLLUTION: A REVIEW ARTICLE

Dahlawi, S.M. and S. Siddiqui. Environmental Science and Pollution Research 24(1): 92-102(2017)

Easy availability, easy preparation, and economic value make calcium polysulfide (CaS₅) a useful inorganic chemical for a variety of agricultural, environmental remediation, and industrial applications. This review of peer-reviewed research on CaS₅ published since 1914 offers a risk assessment of environmental pollution by CaS₅ based on its physicochemical characteristics, stoichiometry, kinetics, and field and industrial applications.

General News

COMMINGLED PLUME TECHNICAL GUIDANCE DOCUMENT

New Jersey Department of Environmental Protection, Site Remediation and Waste Management Program, Version 1.0, 105 pp, 2017

Sites with a comingled plume condition present challenges that can delay and complicate completion of required remedial activities. The technical tools and approaches presented in this manual are meant to provide a better understanding of the potential variability in the data collected, the inherent heterogeneity of the natural system, factors that influence the behavior of comingled plumes (e.g., infiltration rate, DNAPL presence), and other factors that might affect accuracy and confidence in the conceptual site model and subsequent decision-making. Technical approaches provided in this manual can be used to establish multiple lines of evidence to support remedial decisions. The guide also suggests a process to evaluate impacts and impediments to completing remedial activities. Professional judgment may result in a range of interpretations on the application of the technical guidance to site conditions. http://www.nj.gov/denr/serp/guidance/serc/commingled_plume_guidance.pdf

REMEDICATION DECISION-MAKING AND BEHAVIORAL ECONOMICS: RESULTS OF AN INDUSTRY SURVEY

Clayton, W.S. Groundwater Monitoring & Remediation 37(4):23-33(2017)

Decision methods applied in the remediation industry were evaluated using a survey of industry practitioners to assess the relative roles of quantitative decision analysis and gut intuition. The survey was completed by 118 respondents representing academia, consultants, clients, and others. Principles from the disciplines of behavioral economics and decision theory were used as a framework to evaluate remediation decision behaviors revealed by the survey. Survey questions focused on perceptions and experiences related to inputs to decisions and decision processes, as well as remediation goal-setting and outcomes. The most common remediation objective cited was short-term interim measures and the least common was further action (NFA) with clean closure. NFA was also sparingly achieved: 33% of respondents reported zero NFA closures in their career, and an overall 15-20% NFA closure rate was reported among more experienced respondents. Data inputs were ranked most important to decisions, while the decision process itself was ranked lowest. Intuition-based decision methods such as asking for a trusted opinion, rules of thumb, and meetings were all used at least twice as often as decision analysis, such as discounted cash flow or probabilistic analysis. Analysis of survey responses showed that cognitive biases (e.g., overconfidence effect and intuition bias) are present to some extent in remediation decision-making. This paper is **Open Access** at <http://online.liebertpub.com/doi/10.1142/gwr-17-23.pdf>.

KARST GROUNDWATER CONTAMINATION AND PUBLIC HEALTH: BEYOND CASE STUDIES

White, W.B., J.S. Herman, E.K. Herman, and M. Rutigliano (eds).

Springer International Pub., NY. ISBN: 978-3-319-51070-5, 347 pp, 2018

Contaminant transport in karst aquifers and the public health implications of contaminated karst groundwater were the primary topics of a conference held early in 2016 in San Juan, Puerto Rico. The presented papers range from lengthy reviews on contaminant transport mechanisms to short articles summarizing research findings. The conference gathered perspectives from experts in different disciplines. This book offers an integrated conceptual framework for the public health impacts of karst groundwater. The table of contents and abstracts can be viewed at <https://link.springer.com/book/10.1007%2F978-3-319-51070-5>.

THE 33RD ANNUAL INTERNATIONAL CONFERENCE ON SOILS, SEDIMENTS, WATER AND ENERGY, 16-19 OCTOBER 2017, UNIVERSITY OF MASSACHUSETTS AT AMHERST: ABSTRACT BOOK
The Association for Environmental Health & Sciences (AEHS) Foundation, 281 pp, 2017

The conference schedule incorporated 20 sessions on a wide range of topics, including biomonitoring, LNAPL and natural source-zone depletion, in situ ozone remediation, sediments, risk assessment, advanced analytical tools, per- and polyfluoroalkyl substances, sustainability considerations, vapor intrusion, and site investigation. This publication contains the abstracts of the conference presentations and posters. <http://www.aehsfoundation.org/Member/aehsfoundation/Files/Abstract%20Book%20E-2017.pdf>

10TH INTERNATIONAL SEDNET CONFERENCE: SEDIMENTS ON THE MOVE, 14-17 JUNE 2017, GENOA, ITALY

Approximately 150 sediment specialists participated in the event hosted by the University of Genoa. The conference program offered 12 sessions with oral presentations and a variety of poster sessions. Session topics included sediment quality criteria, effects of remedial measures, disposal of sediments at sea, sediment balance, and sediments as a resource. The SedNet 2017 posters, abstracts, and presentations are available online at <http://sednet.org/events/sednet-conference-2017/>.

SCIENTIFIC STAKEHOLDER MEETING ON NANOMATERIALS IN THE ENVIRONMENT

Oekopol, A.E., K. Schwirn, and D. Voelker.
Federal Environment Agency, Germany. 76 pp, 2018

The contents and outcomes of the Scientific Stakeholder Meeting on Nanomaterials in the Environment are summarized in this report. The meeting took place on October 10 and 11, 2017, at the headquarters of the German Environment Agency in Dessau-Rosslau, Germany, with a focus on the regulatory-relevant results of recent German and European research projects on nanomaterials in the environment. The forum allowed presentation of the state of knowledge on environmental nanosafety in a regulatory context as well as the opportunity to discuss scientific results and their relevance to different affected stakeholders. In addition to keynote speeches and platform and poster presentations, a Knowledge Cafe provided the opportunity to discuss nanomaterial issues in smaller groups. The meeting concluded with a discussion of lessons learned. <https://www.umweltbundesamt.de/publikationen/scientific-stakeholder-meeting-on-nanomaterials-in>

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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