

# Technology Innovation News Survey

Entries for April 16-30, 2019

## Market/Commercialization Information

### SAVANNAH RIVER SITE INTEGRATED MISSION COMPLETION SOURCES SOUGHT

Department of Energy, Cincinnati, OH.  
Federal Business Opportunities, Solicitation 89303319REM000055, 2019

DOE's Office of Environmental Management (EM) is currently in the acquisition planning stage for liquid waste stabilization/disposition, nuclear materials management and stabilization, and deactivation and decommissioning among other requirements at the Savannah River Site. DOE is seeking innovative risk-based end-state approaches (based on risk analysis) for completing cleanup activities in a safe, compliant, and efficient manner that results in an accelerated reduction of risk and environmental liability. DOE-EM has developed a website for this procurement at <https://www.emchr.doe.gov/ep/assimc>, which interested parties should monitor for updates. Based upon the responses to this notice, DOE will determine whether or not the full requirements can be performed by 8(a); HUBZone, small disadvantaged, woman-owned, service-disabled veteran-owned, or other type of small business, or by large business. The NAICS code is 562910. All capability statements and questions pertaining to this announcement must be submitted electronically by 5:00 PM ET on Thursday, June 13, 2019, to [SRSIMC@emchr.doe.gov](mailto:SRSIMC@emchr.doe.gov). The details of this sources sought/market research notice are available only on FedConnect at <https://www.fedconnect.net/FedConnect?doc=89303319REM000055&agency=DOE> [Note: It might be necessary to copy and paste the URL into your browser for direct access].

### ENVIRONMENTAL REMEDIAL ACTION CONTRACT

Department of the Navy, NAVFAC Atlantic, Norfolk, VA.  
Federal Business Opportunities, Solicitation N6247019R4003, 2019

This solicitation is a 100% small business set-aside, NAICS code 562910 (Environmental Remediation Services), size standard 750 employees. The Government intends to award a cost-plus-award-fee, IDIQ-type contract for one base year and four one-year option periods. The total maximum value for the contract is \$95M inclusive of the base year and all options. Work will be performed by the issuance of task orders primarily to support remediation of sites contaminated with hazardous substances in accordance with CERCLA in Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, District of Columbia, and Vieques (PR) as well as in areas of Africa, Europe, and Southwest Asia. Quotes must be received by 1:45 PM ET on Friday, June 14, 2019.  
<https://www.fpo.gov/spg/DON/NAVFAC/N62470CON/N6247019R4003/listing.html>

### DFSP SAN PEDRO BFCUST THERMAL REMEDIATION

Defense Logistics Agency (DLA), Fort Belvoir, VA.  
Federal Business Opportunities, Solicitation SPE603-19-R-0512, 2019

This acquisition is a full and open competition under NAICS code 562910. DLA-Energy requires the performance of thermal remediation activities at seven former bulk field-constructed underground storage tanks (BFCUSTs) within the South Tank Farm Area at Defense Fuel Support Point (DFSP) San Pedro, CA, in order to obtain a No Further Action decision. Each BFCUST, surrounding treatment area, and contaminated plume zone is defined as a Site. The seven BFCUSTs were selected for the following in situ thermal remediation technologies: electro-thermally enhanced multi-phase extraction for BFCUSTs 1, 5, 7, 11, and 12, and steam-enhanced thermal extraction at BFCUSTs 4 and 15. The contractor shall be capable of all aspects of thermal remediation design, installation, and operation and of addressing and interpreting all environmental laws and regulations as needed. The requirement is for a 36-month contract with a period of performance from November 1, 2019, to October 31, 2022. Proposals must be received by 3:00 PM ET on July 17, 2019.  
<https://www.fpo.gov/spg/DLA/13/DFESC/SPE603-19-R-0512/listing.html>

### ALPENA AQUEOUS FILM FORMING FOAM (AFFF) REMEDIATION

National Guard Bureau, 127 MSG/MSC, MI ANG, Selfridge Air National Guard Base, MI.  
Federal Business Opportunities, Solicitation W912JB-19-Q-8005, 2019

This requirement is a 100% small business set-aside, NAICS code 562910, size standard \$20.5M. The contractor shall provide all personnel, equipment, tools, materials, supervision, and quality control necessary to perform aqueous film-forming foam (AFFF) remediation services and replace the fire suppression system at Alpena Combat Readiness Training Center, Michigan, in accordance with the performance work statement. Questions must be received by 11:00 AM ET on June 10, 2019. The objective of the firm-fixed-price contract is to provide environmental support to facilitate transition from the present use of 8-carbon-based AFFF (e.g., PFOA and PFOS) to a more environmentally friendly fire suppression product. Period of performance shall be 30 days from award. Quotes are due by 10:00 AM ET on June 20, 2019. <https://www.fpo.gov/spg/DISA/IGCB/DABA20-2/W912JB-19-Q-8005/listing.html>

### AE ENVIRONMENTAL SERVICES — NE AREA

U.S. Postal Service, Facilities Portfolio, Facilities Construction CMC, Washington, DC.  
Federal Business Opportunities, Solicitation 104267-19-A-0014, 2019

This notice constitutes a request for submittal of SF330 packages, NAICS code 541310. Interested firms must request via email a copy of the solicitation and instructions detailing how to submit a proposal. The U.S. Postal Service is seeking sources for the performance of a variety of environmental services: (1) investigative surveys and reports, including environmental due diligence and regulatory response; (2) development of environmentally related scopes of work, design specifications, and cost estimates; (3) site remediation activities; (4) industrial hygiene services (e.g., asbestos-containing materials, lead-based paint, etc.); (5) procurement and submittal of environmental permits and related reports; (6) hazardous waste management and disposal services; (7) emergency response; and (8) minor environmentally related construction. These services will cover facilities in the states of CT, MA, ME, NH, RI, VT, NY, and NJ, and potentially in Puerto Rico and the Virgin Islands. USPS reserves the right to select more than one firm, and contracts may be awarded for one state, multiple states, or all the aforementioned states. The awarded contracts will have a 2-year base ordering period with four 2-year options. The total amount of all work orders under all contracts awarded under this solicitation shall not exceed \$9.9M for the 10-year period of performance. All SF330 packages must be submitted via the USPS SLFT portal by 3:00 PM ET on June 28, 2019.  
<https://www.fpo.gov/notices/aad9564a91ef0d3e06565fd3d555e774>

## Cleanup News

### PROPOSED PLAN FOR SITE REMEDIATION: WIX DILLON SITE, 1422 WIX ROAD, DILLON, SOUTH CAROLINA

South Carolina Dept. of Health and Environmental Control (DHEC), 9 pp, 2018

The Proposed Plan identifies DHEC's preferred alternative for cleaning up toluene-contaminated soil and groundwater at the Wix Dillon site, a manufacturing facility. An air sparge/soil vapor extraction system began operation in December 2009, but this approach was not effective in removing contamination. Wix entered into a Voluntary Cleanup Contract with DHEC in 2013. DHEC has identified Alternative 3—soil excavation followed by aggressive fluid/vapor recovery (AFVR) and monitored natural attenuation (MNA)—as the preferred alternative to address the site's soil and groundwater contamination. Following excavation and off-site disposal of source area soils to remove the principal contamination source, the excavated area would be backfilled with gravel (in lieu of native or borrow soil) to create a highly permeable treatment zone for groundwater containing residual toluene concentrations. Stockpiled clean native soil or borrow soil would be used to backfill the upper 2 ft of the excavation area (0-2 ft bgs). A 4-in diameter extraction well would be installed within the gravel backfill for AFVR application. AFVR is a physical treatment using a truck- or trailer-mounted mobile high-pressure vacuum system to extract groundwater and vapors from extraction and/or monitoring wells. The extracted vapors are treated on site using a catalytic converter on the vacuum truck prior to venting to the atmosphere, while the extracted fluid is managed within a tank and transported off site for treatment and disposal. An initial AFVR event would be conducted to determine the technology's effectiveness. Following mass removal via excavation and AFVR, MNA would be implemented to monitor the physical, chemical, or biological reduction of residual toluene mass at the site. If monitoring indicates that MNA alone is not effective, additional AFVR events might be required.  
[https://www.prod.dhec.sc.gov/HomeAndEnvironment/Docs/WIX/2018-04-16\\_78\\_Proposed%20Plan%20FINAL.pdf](https://www.prod.dhec.sc.gov/HomeAndEnvironment/Docs/WIX/2018-04-16_78_Proposed%20Plan%20FINAL.pdf)

### PROPOSED PLAN FOR SITE REMEDIATION, CASTLEBRIDGE PROPERTIES LLC: SITE 200 AND 280 NATIONAL AVENUE, SPARTANBURG, SOUTH CAROLINA

South Carolina Dept. of Health and Environmental Control (DHEC), 9 pp, 2018

This Proposed Plan identifies DHEC's preferred alternative and rationale for cleaning up contaminated groundwater at the Castlebridge Properties site, a former warehouse with office space. To achieve the RAOs proposed for the site (i.e., U.S. EPA MCLs for PCE, TCE, and their breakdown products), DHEC recommends a combination of Alternative 4 (enhanced reductive dechlorination, or ERD) and Alternative 2 (institutional/land-use controls). With Alternative 4, carbon sources, such as molasses, emulsified vegetable oil, or cheese whey, are introduced to the aquifer via injection wells. During the ERD process, microorganisms in the subsurface use carbon as an energy source, and the contaminants provide one of the respiratory substrates during metabolism, ideally leading to a non-toxic end product, such as ethane. ERD can treat both dissolved and sorbed contaminants, is not limited to a fixed area because it can move with the contaminant plume and is often less expensive than other remediation options. Alternative 2 would be effective in protecting human health on the property because access to the property would be limited by fencing around the site and 24-hour active, manned security measures. Deed restrictions would prohibit future use of the property for residential purposes and future use of groundwater as a potable water supply, eliminating the groundwater exposure pathway. The net present value of these combined alternatives is \$265,000.  
[https://www.prod.dhec.sc.gov/HomeAndEnvironment/Docs/Castlebridge/2018-03-09\\_37\\_Proposed%20Plan%20for%20Site%20Remediation.pdf](https://www.prod.dhec.sc.gov/HomeAndEnvironment/Docs/Castlebridge/2018-03-09_37_Proposed%20Plan%20for%20Site%20Remediation.pdf)

### PROPOSED PLAN FOR SITE REMEDIATION: LAURENS CERAMTEC SITE, 1 AND 2 TECHNOLOGY PLACE, LAURENS, SOUTH CAROLINA

South Carolina Dept. of Health and Environmental Control (DHEC), 12 pp, 2018

A plume of dissolved-phase PCE, TCE, cis-1,2-DCE, VC, 1,1,1-TCA, 1,1-DCE, and 1,1-DCA originates from the materials handling area of Plant 1, and a similar plume emanates from soil near the side of Plant 2. An air biopurge system installed in 2002 continues to operate at Plant 2 to prevent contaminant migration to a nearby creek. The remediation goals for the affected groundwater are the State MCLs. At Plant 1, DHEC has identified Alternative 3—enhanced reductive dechlorination (ERD) source treatment for groundwater and MNA for the dissolved-phase plume with the deed restrictions already in place—as the preferred remedy. Emulsified vegetable oil will be injected into 8 injection wells at the source area in two separate events over 2 years. The entire area will be monitored for a period of 20 years. The cost of this alternative would be about \$800,000 over 20 years. At Plant 2, Alternative 4—source soil vapor extraction (SVE) and ERD, plume ERD, and the biopurge system—comprises the preferred remedy. Fifteen injection wells and 3 SVE wells in addition to a mobile site treatment unit are proposed for this area. ERD, proposed to address the dissolved plume downgradient, is to be performed using a phased approach: source area first, followed by additional injections as indicated by groundwater monitoring data. Operation of the existing biopurge system will continue. Although this alternative has a higher cost than the others, it is easily implemented, should be highly effective, and reduces the cleanup timeframe to within 10 years. The net present worth for this remedial action, adjusted for inflation through Year 10, is about \$1,600,000.  
[https://www.scdhec.gov/sites/default/files/docs/HomeAndEnvironment/Docs/LaurensCeramTec/2018-01-24\\_%2352\\_Proposed%20Plan%20for%20Site%20Remediation.pdf](https://www.scdhec.gov/sites/default/files/docs/HomeAndEnvironment/Docs/LaurensCeramTec/2018-01-24_%2352_Proposed%20Plan%20for%20Site%20Remediation.pdf)

### COLUMBIA STEEL CASTING COMPANY LOWLANDS REMOVAL ACTION: REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

Oregon Department of Environmental Quality, 329 pp, 2018

This feasibility study specifically addresses polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/PCDFs) in soil in low-lying areas along the northern portion of the Columbia Steel Casting Company facility, referred to as the CCSC Lowlands. The proposed remedial action is to excavate soil in Sampling Unit-13 (SU-13) of the East Side Channel and treat residual contamination in additional SUs that contain elevated levels of PCDDs/PCDFs by application of activated carbon (e.g., SediMite™, Filtrasorb 400) to sequester the contaminants. Excavated soil will be transported off site to a Subtitle D landfill. The excavated area will be backfilled and restored to provide wetland functionality.  
<https://www.deq.state.or.us/WebDocs/Controls/Output/PdfHandler.ashx?p=a68b6933-f59b-4561-b0ff-918bca139d4b.pdf>

## Demonstrations / Feasibility Studies

## SOLAR HEATING, HEAT EXCHANGE SPEEDS UP GROUNDWATER REMEDIATION PROCESS

Coyle, C., W. Davis, and P. Zhang.  
The Corps Environment 19(3):17-19(2018)

The Fort Drum Installation Restoration Program (IRP) team successfully demonstrated the application of an innovative, inexpensive, and environmentally sustainable remediation technology called thermal in situ sustainable remediation (TISR) (U.S. patent pending). TISR utilizes solar energy to enhance the remediation of soil and groundwater via a closed-loop system consisting of evacuated tube solar collectors, borehole heat exchangers, heat-transfer fluid (glycol), insulated tubing, and a solar-powered pump to circulate the heat transfer fluid from the solar heaters to the subsurface. The system increases groundwater temperature only by ~10-15deg;C. In most cases, vapor extraction is not required. TISR offers (1) increased bioremediation rates, (2) up to a 50% reduction in life-cycle costs, (3) potential for a ten-fold reduction in carbon dioxide emissions, and (4) effectiveness in complex subsurface geology. Given the success of the pilot study at Area 3805 to address BTEX and trimethylbenzene, the IRP team transitioned the TISR system to a mobile platform to facilitate electricity-free application of solar heat to targeted problem areas. Go to **page 13 of 25** in the PDF page counter at <https://www.dvidshub.net/publication/issues/41684>.

## TREATABILITY TESTING AND REMEDIAL DESIGN FOR IN-SITU REMEDIATION OF CHLOROPICRIN

Martin, C., C. Ross, R. Scott, C. Greene, J. Roberts, and A. Przepiora.  
2018 Battelle Chlorinated Conference, April 8-12, 2018, Palm Springs, CA. Poster, 2018

At a former chemical facility, historical releases of the soil fumigant and pesticide chloropicrin contaminated an area of soil and groundwater. The compound is a strong irritant to the lungs and eyes and remediation challenges at the site included potential health and safety concerns related to chloropicrin emissions to ambient air during any soil removal. The complex geology of the treatment area, the presence of an active railroad spur located within a portion of the treatment area, and chloropicrin contamination in low-permeability soils in both the vadose and saturated zones also limited remediation options. To design an effective remedial strategy, bench-scale treatability studies of in situ chemical reduction with micro-scale zero-valent iron (MZVI) and enhanced in situ bioremediation (including KB-Ireg; Plus augmentation) were tested on site soil and groundwater to assess treatment longevity in the subsurface, performance over the range of chloropicrin concentrations observed throughout the treatment area, and effectiveness at treating separate-phase chloropicrin. Based on treatability test results, the developed remedial approach for the saturated zone consisted of MZVI injection in higher concentration areas and emulsified ZVI combined with KB-1 injection in lower concentration areas. The remedy design also targeted chloropicrin in lower-permeability vadose zone soil using SVE in combination with sand-filled hydraulic fractures to enhance permeability. A phased approach was designed to assess performance of each treatment component while also mitigating downgradient migration of chloropicrin in groundwater.

## FINAL CAPITAL INDUSTRIES PLANT 4 INTERIM ACTION: STAGE 1 IN SITU CHEMICAL OXIDATION REPORT

Washington Department of Ecology, 278 pp, 2019

The work summarized in this ISCO report was part of an interim action pilot study to address chlorinated VOCs (PCE, TCE, and daughter products) in Site Unit 2 at Capital Industries Plant 4, located in Seattle, Washington. This report summarizes the field procedures and process and performance monitoring results for the Stage 1 ISCO injections performed for the pilot study. Potassium permanganate was injected directly into the subsurface to treat shallow soil and groundwater within the water table interval (0-20 ft bgs). The interim action objectives are tied to the remedial action objectives for the site, which include reducing CVOOC concentrations in soil beneath CI Plant 4 to concentrations less than the site preliminary cleanup levels (PCULs) to decrease inhalation risks to acceptable levels; eliminating the potential for future risk to groundwater; and reducing concentrations of CVOOCs in water table interval groundwater to concentrations less than the site PCULs. [http://clients.aspectconsulting.com/W4/2019\\_ISCO\\_Report\\_reduced.pdf](http://clients.aspectconsulting.com/W4/2019_ISCO_Report_reduced.pdf).

## HVDPE PILOT TEST WORKPLAN FOR THE FORMER HOLLEY AUTOMOTIVE/ COLTEC INDUSTRIES FACILITY, WATER VALLEY, MISSISSIPPI

Mississippi Dept. of Environmental Quality (MDEQ), 20 pp, 2018

A 24- to 48-hr pilot test of a high-vacuum dual-phase extraction (HVDPE) system is proposed for chlorinated VOCs (CVOCs) found in the southern portion of the former Holley Automotive/Coltec Industries facility. HVDPE is a process that volatilizes sorbed-phase VOCs and removes those compounds from the unsaturated zone while removing liquid-phase contaminants from the underlying aquifer. The specific objectives of the HVDPE pilot test are to demonstrate the ability of HVDPE to facilitate removal of DNAPL (if present) and associated contaminated groundwater, depress the groundwater table, evaporate CVOCs from the dewatered soil matrix, and capture and treat CVOOC vapors from the induced vadose zone while extracting contaminated groundwater for ex situ treatment. The project will also identify preliminary site-specific design criteria necessary to implement and operate an effective full-scale HVDPE system. [https://www.mdeq.ms.gov/wp-content/uploads/2018/09/2018\\_04\\_06\\_HVDPE-Pilot-Test-Workplan.pdf](https://www.mdeq.ms.gov/wp-content/uploads/2018/09/2018_04_06_HVDPE-Pilot-Test-Workplan.pdf) To further address the plume migrating off the Plant site, in situ chemical reduction (ISCR) injection is proposed for the Plant's northwest parking lot as part of the site remediation systems. The ISCR workplan details the construction of a reactive curtain (RC) utilizing EHCreg; and EHC-Ireg; reagents in a closely spaced **ISCR workplan**: <https://www.mdeq.ms.gov/wp-content/uploads/2018/09/2017-12-22-ISCR-Workplan-for-the-Northwest-Parking-Lot.pdf>

## Research

### COMBINING PHYTOREMEDIATION WITH SOIL FLUSHING FOR ARSENIC REMOVAL FROM CONTAMINATED SOIL

Yan, X., C. Liu, L. Zhong, and J. Wang.  
International Journal of Phytoremediation 20(12):1229-1235(2018)

Pot experiments were carried out to study the As removal effectiveness of planting *Pteris vittata* L. (*P.v.*) and *Lolium multiflorum* L. (*L.m.*) in combination with in situ soil flushing using monopotassium phosphate (KH<sub>2</sub>PO<sub>4</sub>) solutions. Results showed that planting in combination with 8 days of KH<sub>2</sub>PO<sub>4</sub> solution soil flushing achieved As removal efficiencies of 35.20% with *P.v.* and 52.93% with *L.m.* in rhizosphere soil, which was significantly higher than 9.14% removal by soil flushing alone. Results also indicated that the plants changed the speciation of As to a labile form, further facilitating As removal from the soil. See additional information in an earlier paper by these authors at [http://www.ijescr.com/cb/reader/create.php.aspx?file\\_no=S100107421631378X&tag=1](http://www.ijescr.com/cb/reader/create.php.aspx?file_no=S100107421631378X&tag=1).

### AN OVERVIEW OF ELECTROKINETIC SOIL FLUSHING AND ITS EFFECT ON BIOREMEDIATION OF HYDROCARBON CONTAMINATED SOIL

Ramadan, B.S., G.L. Sari, R.T. Rosmalina, A.J. Effendi, and H. Hadrah.  
Journal of Environmental Management 218:309-321(2018)

Electrokinetic soil flushing can be combined with bioremediation as an innovative hybrid solution for treating hydrocarbon-contaminated soil. The addition of surfactants and other flushing/solubilizing agents can increase hydrocarbon remediation efficiency significantly. This paper provides information about fundamental interactions between electrokinetic treatment, flushing agents, and bioremediation. **Copy and paste** the URL - <https://ojs.fo/preprints/insarxiv/3hsq/download> - to see a manuscript version of this paper.

### BIOLOGICAL SYSTEM CHARACTERIZATION TO ADDRESS BIOFOULING OF THE 200 WEST PUMP-AND-TREAT INJECTION WELLS

Bagwell, C.E., D.L. Saunders, J.W. Morad, J.R. Wells, and K.C. Johnson.  
PNNL-28021, 27 pp, 2018

Contaminated groundwater in the 200W Area of the Hanford Site is being treated ex situ by pump and treat, and the subsurface plume is under hydraulic containment. The treatment facility removes uranium, technetium, carbon tetrachloride, and nitrate from the groundwater, but its capacity is constrained by biofouling of the injection wells, which limits efficient injection of treated effluent water to the subsurface. The treatment facility's fluidized bed reactor (FBR) was identified as a principal source of biofouling, and further investigation led to the following main findings: (1) Iodine is accumulating on the granulated activated carbon in the FBR. (2) FBR enrichment cultures were found to attenuate nitrate by dissimilatory nitrate reduction to ammonia, which does not eliminate nitrate from the system but rather converts it to a biologically available form that can lead to microbial contamination in the effluent distribution pipelines and contribute to biofouling at the injection wells. (3) Ferrocyanide was not inhibitory to the FBR enrichment cultures at concentrations [http://www.pnnl.gov/main/publications/external/technical\\_reports/PNNL-28021.pdf](http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-28021.pdf)

### ESTABLISHING VADOSE ZONE SLOW-RELEASE CARBON SOURCES FOR ENHANCED BIOREMEDIATION USING SILICA SUSPENSION

Zhong, L., B.D. Lee, and S. Yang.  
Vadose Zone Journal 17(1):170175(2018) PNNL-SA-129486

Aqueous colloidal silica suspension has characteristics that potentially can be used for nutrient delivery and slow-release carbon source setup for subsurface remediation. Research was conducted to (i) demonstrate delayed gelation of colloidal silica suspensions with the presence of nutrients; (ii) prove that gelation takes place in sediment and the gel slowly releases nutrients; and (iii) show that silica suspensions are injectable for vadose zone emplacement. The nutrient-laden colloidal silica suspensions showed low initial viscosity and then increased in viscosity with time until reaching gelation, allowing for slow release of nutrients into the environment. Higher salt and silica concentrations increased the rate of viscosity climbing and the rate of gelation, whereas higher silica concentrations resulted in stronger gels. Gels released nutrients slowly in both batch and column experiments. The rheological and injection behavior of the silica suspensions revealed the injectability of these fluids. Results demonstrated that colloidal silica suspension could be used as a carrier to distribute nutrients to the vadose zone and establish slow-release nutrient sources. <https://dl.science societies.org/publications/vzj/pdfs/17/1/170175>.

### COMPOST-ASSISTED PHYTOREMEDIATION OF AS-POLLUTED SOIL

Gonzalez, A., P. Garcia-Gonzalo, M.M. Gil-Diaz, J. Alonso, and M.C. Lobo.  
Journal of Soils and Sediments [Published online 9 Mar 2019 prior to print]

A greenhouse experiment was performed using soil artificially contaminated with As at two doses. Sewage sludge composted with pruning waste was used (40 t/ha) as amendment. After the plants reached the end of their growing cycles, As uptake, plant physiological and biochemical parameters, and As availability and physicochemical properties in soil samples were analyzed. The plant species exhibited different behaviors with compost application. Compared to wheat and irrespective of As doses, barley plants in compost-amended soils showed an enhanced As translocation to the aerial part. Although either species could be used for phytoremediation of As-polluted soils, barley is of greater interest for phytoremediation due to its higher biomass and high As translocation when compost is applied to As-contaminated soil.

### GAS-PHASE DETECTION OF FLUOROTELOMER ALCOHOLS AND OTHER OXYGENATED PER- AND POLYFLUOROALKYL SUBSTANCES BY CHEMICAL IONIZATION MASS SPECTROMETRY

Riedel, T., J. Lang, M. Strynar, A. Lindstrom, and J. Offenberg.  
Environmental Science & Technology Letters 6(5):289-293(2019)

Chemical ionization mass spectrometry with iodide reagent ion chemistry was evaluated for the detection of fluorotelomer alcohols (FTOHs) and other oxygenated PFASs, including per- and polyfluoro carboxylic acids, such as hexafluoropropylene oxide dimer acid. Measurements were taken by direct volatilization of samples without prior processing, which allowed for fast measurements and reduced sample treatment compared to established PFAS methods. The utility of this technique was validated by sampling volatile and semivolatile PFASs from fluoro additives and fluoro products to quantify levels of FTOHs and identify additional fluorinated compounds for which standards were unavailable. <https://doi.org/10.1021/acs.estlett.9b00196>.

### IDENTIFICATION OF PER- AND POLYFLUOROALKYL SUBSTANCES IN THE CAPE FEAR RIVER BY HIGH RESOLUTION MASS SPECTROMETRY AND NONTARGETED SCREENING

McCord, J. and M. Strynar.  
Environmental Science & Technology 53(9):4717-4727(2019)

Nontargeted screening was applied to samples obtained from the Cape Fear River of North Carolina, a fluorochemically impacted watershed. The continued presence of perfluorinated ether acids was confirmed by the detection of a total of 37 unique chemical formulas comprising 58 isomers. Structural determination was carried out by LC-MS/MS to determine isomeric structures where possible. Novel structures determined included perfluorinated ether acid species containing two acidic sites, polyfluorinated ether acids containing a single hydrogenation, and previously

unreported perfluorinated ether acids. Compounds identified by an initial nontargeted screen were monitored over repeated sampling to track long-term reductions in PFAS content during emission source control. Hierarchical clustering of the time-course data was used to associate groups of chemicals based on their trends over time. Six clusters were identified and showed some similarity in chemical class; they are believed to represent the by-products of different fluorochemical production lines. [See also a brief note on this study.](https://pubs.org/doi/10.1021/acs.est.8b01082)

#### **SOLIDIFICATION AND STABILIZATION OF HEAVY METAL-CONTAMINATED INDUSTRIAL SITE SOIL USING KMP BINDER**

Xia, W.-Y., Y.-J. Du, K.R. Reddy, Y.-S. Feng, W.-W. Ren, and M.-L. Wei.  
Journal of Materials in Civil Engineering 30(6):2018 (2018)

KMP, a new and innovative binder composed of acid-activated phosphate rock, monopotassium phosphate, and reactive magnesia, was developed for solidification/stabilization of soils contaminated with heavy metals, such as Pb, Zn, and Cd. An investigation of the strength, leachability, and microstructural properties of KMP-stabilized field clayey soil was conducted for a smelter site contaminated with Pb, Zn, and Cd. With increasing binder content and curing time, the leached Pb, Zn, and Cd concentrations decreased while the unconfined compressive strength and dry density of the stabilized soil increased. Sequential extraction results indicated the transfer of large percentages of Pb, Zn, and Cd from the exchangeable fraction to the residual fraction after KMP stabilization. Analyses demonstrated the formation of magnesium phosphate-based products and heavy metal phosphate-based products in the stabilized soil—the primary mechanisms for strength increase and heavy metal immobilization, respectively. *See also a comparison of the performance of KMP binder and Portland cement at* [http://www.ejge.com/2018/5/Pr2018\\_0046ma.pdf](http://www.ejge.com/2018/5/Pr2018_0046ma.pdf).

#### **KEY DESIGN ELEMENTS OF BUILDING PRESSURE CYCLING FOR EVALUATING VAPOR INTRUSION: A LITERATURE REVIEW**

Lutes, C.C., C.W. Holton, R. Truesdale, J.H. Zimmerman, and B. Schumacher.  
Groundwater Monitoring & Remediation 39(1):66-72(2019)

As a tool for studying vapor intrusion, building pressure cycling (BPC) has been used to distinguish subslab and indoor sources of vapor intrusion as well as to define reasonable worst-case VOC mass discharge into a structure. This paper offers a review and comparison of the protocols and outcomes from multiple published applications of this technology to define the key variables that control performance. Common lessons learned include the variables that help define the range of building size and type to which BPC is applicable. Differences in test protocols and research gaps are also identified and discussed. <https://doi.org/10.1111/gwrm.12310>

#### **LOW-CONCENTRATION HYDROGEN PEROXIDE (LCHP) VAPOR FOR BIOREMEDIATION**

Touati, A., F. Delafield, D. Aslett, and A. Abdel-Hady.  
EPA 542-R-19-001, 82 pp, 2017

EPA's Chemical, Biological, Radiological, and Nuclear Consequence Management Advisory Division of the Office of Emergency Management and the National Homeland Security Research Center provide information to the response community on decontamination technologies for restoring sites contaminated with biological, chemical, or radiological agents. This report describes the research effort that evaluated the sporicidal efficacy of low-concentration hydrogen peroxide (LCHP) vapor in a typical residential home contaminated with *Bacillus anthracis* (anthrax). The LCHP vapor was generated from a 3-4% H<sub>2</sub>O<sub>2</sub> aqueous solution in water placed in commercial off-the-shelf humidifiers. The goal of this work was to demonstrate the efficacy of the fumigant distribution method in a full-scale structure and identify the variables that affect fumigant distribution. <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100WHXT.txt>

#### **EFFICACY OF INDIGENOUSLY PREPARED SUGARCANE AND PINEAPPLE WINE SOLVENTS FOR WASHING HIGHLY DIOXIN-CONTAMINATED FIELD SOILS**

Vu, C.T., H.T. Tran, A. Kaewlaoyong, W.-Y. Huang, and C. Lin.  
Applied Sciences 9(1):61(2019)

Although commercial solvents have been used to remove dioxins from contaminated soil, the solvents themselves may have an adverse effect on soil health. The effects of washing dioxin-contaminated field soil with two natural solvents (sugarcane and pineapple wine) under ambient temperature were investigated in an initial three-washing-cycle experiment. Sugarcane wine removed the contaminants more effectively than pineapple wine (60% vs. 50% removal). Sugarcane wine subsequently used in a six-washing-cycle experiment facilitated by mechanical stirring and ultrasonication demonstrated almost 80% removal efficiency, largely due to its higher alcohol and acid content. Either wine appeared unlikely to damage soil health when used in soil remediation tasks. <https://www.mdpi.com/2076-3417/9/1/61/html>

### **General News**

#### **SUPERFUND: TRANSFORMING COMMUNITIES — FY 2018 ACCOMPLISHMENTS REPORT**

U.S. EPA, Office of Land and Emergency Management, Washington, DC. 24 pp, 2018

The Superfund removal program conducts emergency and shorter-term responses when contamination poses an imminent and substantial threat to human health or the environment. The Superfund remedial program is responsible for long-term cleanups of contaminated sites. This report shares the FY 2018 accomplishments of the Superfund program. <https://www.epa.gov/superfund/superfund-remedial-annual-accomplishments>

#### **UNDERGROUND STORAGE TANK TECHNICAL COMPENDIUM: FINANCIAL RESPONSIBILITY**

U.S. EPA, Office of Underground Storage Tanks, Washington, DC.  
EPA 510-B-18-002, 23 pp, 2018

The compendium document contains interpretations and guidance letters sent out by the Office of Underground Storage Tanks. <https://www.epa.gov/sites/production/files/2014-11/documents/compend-fr.pdf> - For examples of questions on financial responsibility that the interpretations and guidance letters were developed to answer, go to <https://www.epa.gov/ust/ust-technical-compendium-financial-responsibility>.

#### **BIOTECHNOLOGICAL STRATEGIES FOR EFFECTIVE REMEDIATION OF POLLUTED SOILS**

Kouli, B. and P. Taak.  
Springer Nature, Singapore. ISBN: 978-981-13-2419-2, 240 pp, 2018

The nine chapters in this book primarily focus on the utilization of algae, plants, plant-associated bacteria, fungi (endophytic or rhizospheric), and certain lower animals for sustainable bioremediation of organic and inorganic contaminants. Recent techniques are also covered, such as biochar and biofilms for carbon sequestration, soil conditioning, and soil and water remediation, in addition to recent advances in nanobioremediation based on biosynthetic nanoparticles. Case studies highlight successful treatment of contaminated soils by implementation of these strategies. *View the table of contents and chapter abstracts at* <https://www.springer.com/gp/book/9789811324192>.

#### **NATURAL AND ENHANCED ATTENUATION OF CONTAMINANTS IN SOILS, SECOND EDITION**

Yong, R.N. and C.N. Mulligan.  
CRC Press, Boca Raton, FL. ISBN: 978-1-1380-6637-3, 308 pp, 2019

This new edition updates the principles and fundamentals of natural attenuation of contaminants with a broader view of the field gained since its original publication in 2003. It covers new methods for evaluating natural attenuation mechanisms and microbial activity at lab and field scales. Case studies are provided along with actual treatments and protocols, theoretical processes, numerical models, and legal aspects of the natural attenuation of organic and inorganic contaminants. Future directions for implementation of natural attenuation and enhanced remediation techniques are also considered. *View the table of contents and chapter abstracts at* <https://www.taylorfrancis.com/books/9781315159195>.

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](mailto:adam.michael@epa.gov) or (703) 603-9915 with any comments, suggestions, or corrections.

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