

# Technology Innovation News Survey

## Entries for June 16-30, 2018

### Market/Commercialization Information

#### SUPERFUND TECHNICAL ASSESSMENT RESPONSE TEAM (START)

Environmental Protection Agency, Office of Acquisition Management, Region V, Chicago.  
Federal Business Opportunities, FBO-5991, Solicitation 68HE0518R0005, 2018

U.S. EPA Region 5 will soon release an RFP to fulfill upcoming Superfund Technical Assessment Response Team (START) requirements for contractor support and consulting services in environmental cleanup for Region 4 (AL, FL, GA, KY, MS, NC, SC, TN) and Region 5 (IL, IN, MI, MN, OH, and WI). No set-asides are anticipated. The NAICS code for this requirement is 541620 (Environmental Consulting Services), small business size standard \$15M. Most of the technical support services are applicable to nationally consistent assistance to EPA's On-Scene Coordinators and other federal officials implementing EPA's responsibilities under the national response system. The prospective contractor will be required to provide services to support response and site assessment. Separate proposals will be required for each Region. EPA has provided background for the forthcoming procurement in the form of a DRAFT RFP available only on FedConnect at <https://www.fedconnect.gov/FedConnect?doc=68HE0518R0005&agency=EPA> [Note: It might be necessary to copy and paste the URL into your browser for direct access]. The draft RFP is not in final form and is subject to change.

#### ENVIRONMENTAL A/E SERVICES

Department of the Army, U.S. Army Corps of Engineers, USACE District, Baltimore, MD.  
Federal Business Opportunities, FBO-5976, Solicitation W912DR-18-S-0009, 2018

The U.S. Army Corps of Engineers, Baltimore District plans to issue an RFP on or about August 3, 2018, as an 8(a) small business set-aside for support services for the Defense Supply Center Richmond Environmental Restoration Program under a firm-fixed-price contract. The contractor shall be responsible for sampling groundwater, conducting remedial actions, updating the community involvement and management action plans, conducting vapor intrusion sampling, maintaining land use controls, and performing monitoring well installation and abandonment. The contractor must have the capability and experience to perform or provide a wide range of investigative and remedial services for hazardous substances and waste sites under NAICS code 541620. Certain pollutants and contaminants are an issue at the project sites (e.g., perfluorinated compounds).  
[https://www.fbo.gov/index.php?c=opportunity&mode=form&id=a5d3e9340f6e55de91c30f2fed210af8&tab=core&\\_view=1](https://www.fbo.gov/index.php?c=opportunity&mode=form&id=a5d3e9340f6e55de91c30f2fed210af8&tab=core&_view=1)

#### INTERNATIONAL FORUM TO ADVANCE FIRST RESPONDER INNOVATION (IFAFRI)

Department of Homeland Security, Orient Point, NY.  
Federal Business Opportunities, FBO-5981, Solicitation DHS\_FRG\_IFAFRI\_20180809, 2018

The U.S. Department of Homeland Security Science and Technology Directorate invites members of the private sector, academia, federal laboratories, and the innovation community to attend a Stakeholder Summit from 8:30 AM-2:30 PM on Thursday, August 9, 2018, in Washington, DC, at the National Association of Home Builders, 1201 15th Street NW. Admission of registered attendees begins at 7:30 AM. The Summit will consist of a discussion of common global first responder capability gaps and markets as identified by the International Forum to Advance First Responder Innovation. Current capability gaps include the ability to (1) know the location of responders and their proximity to risks and hazards in real time; (2) detect, monitor, and analyze passive and active threats and hazard at incident scenes in real time; (3) rapidly identify hazardous agents and contaminants; and (4) incorporate information from multiple and non-traditional sources (e.g., crowd-sourcing and social media) into incident command operations. This event will provide an opportunity for attendees to learn about these high-priority global first responder capability gaps, as well as the potential marketplace for developed solutions. Admission is free. All attendees must register prior to the day of the Summit no later than 2:00 PM ET on August 7, 2018. Files containing the meeting agenda and background information for the event are attached to the FedBizOpps notice.  
[https://www.fbo.gov/spg/DHS/OCPD/BIADC/DHS\\_FRG\\_IFAFRI\\_20180809/listing.html](https://www.fbo.gov/spg/DHS/OCPD/BIADC/DHS_FRG_IFAFRI_20180809/listing.html)

#### SYNOPSIS FOR HANFORD SITE TECHNICAL SUPPORT SERVICES SOLICITATION

U.S. Department of Energy, Office of River Protection, Richland, WA.  
Federal Business Opportunities, FBO-5954, Solicitation 89304018REM000005, 2018

When DOE releases RFP 89304018REM000005 for the Hanford Site Technical Support Services, the procurement will be an 8(a) set-aside under NAICS code 541620, size standard \$15M. A multi-award IDIQ to as many as five offerors is anticipated. The Hanford Site Technical Support Services contractors will provide support—including highly qualified, innovative professionals and technical and subject-matter experts as needed—for activities involving engineering, management consulting, and hazardous waste collection and treatment at the Hanford Site. New contracts resulting from this acquisition will replace current individual 8(a) contracts (which begin to expire October 31, 2018) that cover the same scope. Monitor  
<https://www.fedconnect.gov/FedConnect?doc=89304018REM000005&agency=DOE> for updates [Note: It might be necessary to copy and paste the URL into your browser for direct access].  
<https://www.fbo.gov/spg/DOE/PAM/HQ/89304018REM000005/listing.html>

#### CENTRAL PLATEAU CLEANUP CONTRACT (CPCC) PROCUREMENT

U.S. Department of Energy, EM Consolidated Business Center, Cincinnati, OH.  
Federal Business Opportunities, FBO-5993, Solicitation 89303318REM000008, 2018

DOE anticipates releasing a DRAFT RFP for the Central Plateau Cleanup Contract (CPCC) procurement by the end of the fourth quarter of FY2018. The future procurement will be 100% full and open competition under NAICS code 562910. The CPCC contractor will provide services to conduct the safe, secure, compliant, and cost-effective environmental cleanup of select portions of the Hanford Site. Critical scope covered under this contract includes services for the transition from the Plateau Remediation Contract (expires 9-30-18) to the CPCC; management of site operations for DOE Richland cleanup facilities; waste site remediation and facility deactivation, decommissioning, decontamination, and demolition; transuranic waste management; RCRA/CERCLA decision documents to support cleanup actions associated with the tri-party Hanford Federal Facility Agreement and Consent Order; underground waste storage tank closure; additional environmental cleanup tasks; and business core functions to support these efforts. DOE intends to conduct a pre-solicitation conference, site tour, and one-on-one sessions with interested parties. A dedicated webpage has been established for this procurement, and all announcements, documents (including the Draft and Final RFP), pre-solicitation conference information, and related links will be posted to <https://www.emchc.doe.gov/SEB/CPCC/>. Information will also be posted on FedConnect at <https://www.fedconnect.gov/FedConnect?doc=89303318REM000008&agency=DOE> [Note: It might be necessary to copy and paste the URL into your browser for direct access].

### Cleanup News

#### BISC SEMI-ANNUAL MONITORING AND PERFORMANCE REPORT, REV. 1: JULY 1 TO DECEMBER 31, 2017, PERCHLORATE BIOREMEDIATION SYSTEM, HENDERSON, NEVADA

Nevada Div. of Environmental Protection, Bureau of Industrial Site Cleanup (BISC), 178 pp, 2018

This monitoring and performance report for the perchlorate treatment system at Henderson, Nevada, documents groundwater monitoring and fluidized bed reactor (FBR) remediation system data collected from July 1, August 2011, 2017, as well as the results of 11 annual monitoring well sampling events. Groundwater treatment system operation is based at a 9,000 ft<sup>2</sup> building located within a 1.77-acre site in Henderson. The FBR system began operation in late September 2012 and is designed to remove perchlorate from groundwater extracted from the Valley Auto Mall area (near the source area close to the former PEPCON facility) as well as the shallow groundwater bearing zone before it enters the Las Vegas Wash. The treatment system comprises 14 extraction wells, a water handling and FBR treatment plant, and a discharge system. The FBR plant consists of two first-stage FBRs that contain sand while a second-stage FBR contains granular activated carbon. Microorganisms growing as a film on the media utilize metabolic pathways to reduce perchlorate, chlorate, nitrate, and oxygen in redox reactions that result in nitrogen, groundwater, and minerals. Ethanol is added as an electron donor along with nutrients (di-ammonium phosphate/urea mixture) and other trace elements. The pH is adjusted through the addition of a 50% (by weight) solution of sodium hydroxide. <https://ndep.nv.gov/uploads/env-sitecleanup-active-hmi-amparc/endeavour-2h2017-report.pdf>

#### SEREBAR: A REVIEW OF 11 YEARS OF OPERATION

CL:AIRE Case Study Bulletin, CSB 12, 5 pp, 2018

The SEquential REactive BARrier (SEREBAR) groundwater treatment system is a permeable reactive barrier (PRB) that was constructed on a former gasworks site in 2003. It was one of the first biologically based PRB systems installed in the UK. SEREBAR has been in operation since 2004, and this bulletin provides a review of the system's performance over the period 2004 to 2015. This effort forms one of the longest running research projects of its kind in the world and one of the few that has provided active contamination management on a commercial scale. Except for situations where the system was vandalized, the PRB performed very effectively in maintaining hydraulic control over the contaminant plume and treating the target contaminants, including some compounds, such as cyanide, it was not designed to treat. The main issue was the original pump, but switching to a peristaltic pump improved system reliability. The GAC canisters generally provided an effective polishing step, removing residual contaminants to acceptable concentrations before discharge downgradient (overall contaminant mass removal >95%). The SEREBAR system was probably over-engineered for the expected contaminants (PAHs and BTEX), but this provided the flexibility to counter localized changes in groundwater contamination, the increasing cyanide concentration in particular. Aerating the oil-water separator proved useful in increasing the system's biodegradation capacity.  
<https://www.claire.co.uk/component/phocadownload/category/3-case-study-bulletins?download=631:csb12-serebar-a-review-of-11-years-of-operation>

#### SITE-WIDE GROUNDWATER PROGRESS REPORT FOR THE FORMER HOFFMANN-LA ROCHE INC. FACILITY, NUTLEY, NEW JERSEY

Hoffmann-La Roche Nutley Remediation Project Website, 50 pp, 2017

The total of 59 confirmed groundwater contaminants for this site includes chlorinated VOCs, SVOCs, 1,4-dioxane, pesticides, and metals. In-well air stripping (IWAS) and ozone injection activities were initiated in the IA-1/4 interim remedial measure (IRM) in August 2015 and continue to the present. IA-2 in situ thermal treatment operations were completed in early 2016. The VOC plume south of the IA-2 Tank Farm, which had migrated into the northern portion of IA-5, was successfully remediated with an IWAS system (99.9% VOC reduction), and those wells were closed in December 2016. Also in December 2016, an area of VOC-contaminated groundwater beneath the thermal treatment zone was further addressed by installation and operation of two IWAS wells; operation is ongoing. IWAS and enhanced in situ bioremediation (EISB) amendment injection equipment was installed in the IA-3/7 IRM area between December 2016 and March 2017. Operation of the treatment systems and initial EISB amendment injections began in April 2017, with a second round in July 2017. The IA-6 IWAS/in situ chemical oxidation (ISCO) IRM system began operation in April 2016 and continues to the present. Successful removal of chlorobenzene in the target treatment zone was achieved in January 2017, and IWAS remediation of residual chlorobenzene and CVOC concentrations continued through July 2017. In 2015, two IRMs consisting of one-time bioamendment injections into shallow groundwater were completed in IA-10. Roche completed the excavation of PCE-contaminated weathered bedrock from beneath the abandoned Clifton-Allwood municipal sewer (CAMS) manhole in IA-11 to a depth of 26 ft bgs between January and March 2017 and backfilled the excavation with gravel containing a bioamendment to encourage reductive dechlorination of residual CVOCs in local groundwater. Groundwater monitoring demonstrated that the source zone has been remediated successfully. The IA-12 IWAS/ISCO system targeting the CVOC plume where breaches in the CAMS were found began operation in late June 2016 and is ongoing. <http://www.roche-nutley.com/home/BioremediationUpdates/GWUpdateNov2017.html>

#### IN SITU BIOREMEDIATION OF A DNAPL SOURCE AND PLUME: 8 YEARS OF PERFORMANCE DATA

Jacob, C.L. Geological Society of America, Abstracts with Programs 49(6):Paper 69-32(2017)

Full-scale treatment of a TCE source zone and 12-acre plume began in 2005 beneath an active manufacturing building near Portland, Oregon, using food-grade vegetable oil (VO). Contamination occurs within a shallow alluvial aquifer at 10-30 ft, underlain by a competent aquitard. DNAPL was observed, and the maximum baseline TCE concentration in groundwater was 1,170,000 µg/L. Baseline monitoring documented TCE and cDCE predominance in the source and plume, respectively, with low levels of VC and end products ethene and ethane. Effective treatment was achieved at a low cost and with minimal disruption to manufacturing operations using a 2-yr injection frequency. A coarse emulsion of VO and potable water was injected to 18 source wells on 10- to 20-ft centers. About 20,000 gal of 23% VO emulsion was injected during each event. Source zone VO injection resulted in active bioremediation in the source and up to 800 ft downgradient, and decreased total chlorinated ethene molar mass in the source and throughout the downgradient plume. Increased TOC and methanogenic aquifer redox conditions characterize the active bioremediation zone. Source wells have transitioned from TCE to cDCE predominance with substantial VC and some ethane/ethene also detected. Detection of acetylene in source zone groundwater indicates concurrent abiotic mass destruction. Downgradient wells have transitioned from cDCE to ethane/ethane predominance and total chlorinated ethenes have decreased by 99% throughout the downgradient plume.

## Demonstrations / Feasibility Studies

### USING FROZEN BARRIERS FOR CONTAINMENT OF CONTAMINANTS

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

In the summer of 2011, a full-scale field test of a frozen soil barrier was deployed at the Cold Regions Research and Engineering Laboratory site, Fort Wainwright, Fairbanks, Alaska. Hybrid thermosyphons, a more efficient cooling technology than conventional ground freezing, were used to create the frozen soil. The hybrid units were actively cooled by a 4.5 kw refrigeration condensing unit for 62 d. A vertical frozen barrier of 9 m extending from a depth of 7 m bgs was completed in 42 d, and the barrier was 1 m thick in 48 d. The frozen barrier installation has demonstrated that this technology can freeze the ground quickly. At the end of winter 2012, the barrier was ~3.8 m thick, a thickness maintained throughout the summer of 2012. Only the top 0.5 m thawed even though the cooling system was inactive for about a year. An analysis to compare the cost of frozen barriers and slurry walls concluded that construction and O&M costs of frozen barriers are on par with other barrier systems. <https://usace.contentdm.oclc.org/digital/api/collection/p265001coll1/ir4480/download>

### BIOREMEDIATION OF OIL AND HEAVY METAL CONTAMINATED SOIL IN CONSTRUCTION SITES: A CASE STUDY OF USING BIOVENTING-BIOSPARING AND PHYTOEXTRACTION TECHNIQUES

Eslami, E. and S.H.S. Joodat.  
Cornell University, eprint arXiv:1806.03717, 2018

Activities at a construction site located in Garmdareh, Karaj, Iran, contaminated the site with BTEX, PAHs, and heavy metals. Coupled bioventing-biosparing and phytoextraction were implemented to remediate the deep and shallow layers of the contaminated site, respectively. The widespread presence of cement components (as dust, particles, and structures or large remnants) in the site affected the performance of bioremediation techniques. Results indicated that cement presence lowered the degradation rate of both BTEX (ethylbenzene) and PAH (pyrene) pollutants within deep layers. Conversely, the Pb removal rate increased during phytoextraction due to the stabilization effect of cement components on surficial soil. This study provides a critical view of the limitations and influential parameters of function-directed soil remediation techniques in the presence of cementitious materials in construction sites. <https://arxiv.org/abs/1806.03717>

### LOW-IMPACT PILOT STUDY LEADS TO EXPANDED TREATABILITY EVALUATION CONFIRMING BIOSTIMULATION SAFE, SUSTAINABLE AND COST-EFFECTIVE CVOC REMEDIATION STRATEGY

Armstrong, K. and B.L. Forslund.  
IPEC 2017: 24th Annual International Petroleum Environmental Conference, 73 slides, 2017

At an inactive manufacturing facility in Belmont County, Ohio, chlorinated VOCs (TCE and daughter products DCE and VC) were documented in groundwater, saturated and unsaturated soils, and fractured bedrock. The chlorinated VOC baseline total ranged >50,000 µg/L to >1,000,000 µg/L. Existing pump and treat operating since the mid-2000s utilized 3 extraction wells for hydraulic containment in fill/alluvial soils overlying sandstone/shale bedrock. A pilot evaluation of the biostimulant ERDenhanced™ was performed March 2013-May 2014. The pilot used additive-filled passive-release-sock deployment units replaced at 8-10 week intervals to amend the 3-ft area of influence. Groundwater monitoring data showed that each amended location at T=17 months realized >98% reductions, which led to expansion of the treatment area to 35 ft x 35 ft (10 ft vertical component) and additional injections of biostimulant slurry. Analytical testing was performed quarterly through October 2016. This treatability evaluation demonstrated that the pilot results were transferable to full-scale application and that the biostimulation product provided a sustainable and cost-effective remediation strategy for dissolved-phase/residual mass chlorinated VOCs.

Slides: <https://rese.utulsa.edu/wp-content/uploads/2017/11/IPEC-2017-Cost-Effective-In-Situ-Remediation-Biostimulation-as-a-Residual-Source-Mass-Remediation-Strategy.pdf>  
Longer abstract: <https://rese.utulsa.edu/low-impact-pilot-study-leads-expanded-treatability-evaluation-confirming-biostimulation-safe-sustainable-cost-effective-cvoc-remediation-strategy/>

### REVISED WASTE DISCHARGE REQUIREMENTS FOR ORANGE COUNTY WASTE & RECYCLING, REGARDING THE CLOSED COYOTE CANYON LANDFILL, NEWPORT BEACH, ORANGE COUNTY

California Regional Water Quality Control Board, Santa Ana Region. 57 pp, 2018

The landfill is a closed, unlined Class III, non-hazardous municipal solid waste landfill that operated from August of 1963 to March of 1990. Site closure was implemented between 1992 and 1994. Since the mid-1980s, chlorinated VOCs (PCE, TCE, cDCE, and VC) have been detected in groundwater beyond the waste footprint of the landfill at concentrations exceeding the federal and State drinking water MCLs. To address the VOC release in groundwater, which is partially attributed to landfill gas diffusion, the Discharger is actively operating a landfill gas extraction and collection system and has completed a 2-yr (June 2015 - June 2017) enhanced in situ bioremediation pilot project. Conducted June 23-30, 2015, the pilot consisted of a network of five direct-push injection points that delivered 15,000 gal of substrate and dechlorinating microbes to the subsurface, plus three monitoring wells to assess treatment effectiveness. The pilot project has shown sequential breakdown of VOCs (reductions of 90% TCE, 61% cDCE, and 14% VC). Monitored natural attenuation is proposed as the final remedial measure to meet site cleanup objectives in addition to any necessary measures to control ongoing VOC release from the landfill.

[https://www.waterboards.ca.gov/santana/boards\\_decisions/tentative\\_orders/docs/2018/BB-2018-0009\\_tentative.pdf](https://www.waterboards.ca.gov/santana/boards_decisions/tentative_orders/docs/2018/BB-2018-0009_tentative.pdf) Follow up on the pilot's long-term biodegradation progress and other cleanup measures in the semi-annual groundwater monitoring reports at [http://geotracker.waterboards.ca.gov/profile\\_report?global\\_id=L10004005233](http://geotracker.waterboards.ca.gov/profile_report?global_id=L10004005233)

## Research

### FLUORESCENT DYES: A NEW WEAPON FOR CONQUERING DNAPL CHARACTERIZATION

Horst, J., N. Welty, R. Stuetzle, R. Wenzel, and R. St. Germain.  
Groundwater Monitoring & Remediation 38(1):19-25(2018)

A new class of tools can provide high-resolution simultaneous characterization of DNAPL presence and aquifer permeability. These tools build on established optical screening and contaminant fluorescence detection technology that has provided real-time, high-resolution mapping of petroleum hydrocarbons, creosotes, and coal tar-based NAPLs. Now adapted to nonfluorescent organic NAPLs, the optical screening tools can dramatically improve the characterization of these challenging source zones. The application of this technology is illustrated in an example of a refined conceptual model for a highly complicated and mature DNAPL source zone. The refinement sheds light on details that will help future remedial action avoid failure due to conditions that otherwise might not be well understood. This paper is temporarily **Open Access** at <https://onlinelibrary.wiley.com/doi/full/10.1111/gwmr.12261>.

### MODIFICATIONS TO EPA METHOD 3060A TO IMPROVE EXTRACTION OF CR(VI) FROM CHROMIUM ORE PROCESSING RESIDUE-CONTAMINATED SOILS

Mills, C.T., C.R. Bern, R.E. Wolf, A.L. Foster, J.M. Morrison, and W.M. Benzel.  
Environmental Science & Technology 51(19):11235-11243(2017)

USGS scientists modified various parameters of EPA 3060A toward understanding the transformation of chromium ore processing residue (COPR) minerals in alkaline extraction and improving extraction of Cr(VI) from NIST SRM 2701, a standard COPR-contaminated soil. Aluminum and Si were the major elements dissolved from NIST 2701, and their concentrations in solution were correlated with Cr(VI). The extraction fluid leached additional Al and Si from the method-prescribed borosilicate glass vessels, which appeared to suppress Cr(VI) release. Use of polytetrafluoroethylene vessels and intensive grinding of NIST 2701 increased the amount of Cr(VI) extracted. The modifications, combined with an increased extraction fluid to sample ratio of ~900 mL/g and 48-h extraction time, resulted in a maximum release of  $1274 \pm 7$  mg/kg Cr(VI). Slides: <http://apps.nrlac-institute.org/nemc/2017/docs/pdf/Friday-Metals%20and%20Metal%20Speciation%20Analysis%20in%20Environmental%20Samples-28.6-Mills.pdf>

### SURVIVAL OF VINYL CHLORIDE RESPIRING *DEHALOCOCCOIDES MCCARTYI* UNDER LONG-TERM ELECTRON DONOR LIMITATION

Mayer-Blackwell, K., M.F. Azizian, J.K. Green, A.M. Spormann, and L. Semprini.  
Environmental Science & Technology 51(3):1635-1642(2017)

Effects on *Dehalococcoides mccartyi* (*dhc*) population structure resulting from a change in the ratio of electron donor to chlorinated electron acceptor were investigated in continuously stirred tank reactors operated over 7 years. When the electron donor formate was supplied in stoichiometric excess to TCE, both *tceA*-containing and *vcrA*-containing *dhc* populations persisted, and near-complete dechlorination to ethene was stably maintained. When the electron donor formate was supplied at substoichiometric concentrations, the interactions between *tceA*-containing and *vcrA*-containing populations shifted toward direct competition for the same limiting catabolic electron donor substrate, with subsequent niche exclusion of the *vcrA*-containing population. After more than 2000 days of operation under electron donor limitation, increasing the electron donor to TCE ratio facilitated a recovery of the *vcrA*-containing *dhc* population to its original frequency. Results demonstrated that electron donor scarcity alone, in the absence of competing metabolic processes or inhibitory dechlorination intermediate products, is sufficient to alter the *dhc* population structure.

### DEVELOPMENT AND APPLICATION OF A RAPID, USER-FRIENDLY, AND INEXPENSIVE METHOD TO DETECT *DEHALOCOCCOIDES* SP. REDUCTIVE DEHALOGENASE GENES FROM GROUNDWATER

Kanitkar, Y.H., R.D. Stedtfeld, P.B. Hatzinger, S.A. Hashsham, and A.M. Cupples.  
Applied Microbiology and Biotechnology 101(11):4827-4835(2017)

A novel approach for determining the abundance of *Dehalococcoides* sp. in groundwater samples from chlorinated solvent-contaminated sites needs only low-cost lab equipment (a bench-top centrifuge and a water bath) and performs in less time and with fewer resources compared to quantitative polymerase chain reaction (qPCR). The method involves the concentration of biomass from groundwater, without DNA extraction, and loop-mediated isothermal amplification (LAMP) of the cell templates. The amplification products are detected by a simple visual color change (orange/green). The detection limits of the assay were determined using groundwater from a contaminated site, and the assay was tested with groundwater from three additional contaminated sites. The final approach to detect Rdase genes without DNA extraction or a thermal cycler was successful to  $1.8 \times 10^3$  gene copies per L for *vcrA* and  $1.3 \times 10^3$  gene copies per L for *tceA*. Both values are below the threshold recommended for effective in situ dechlorination. See more in Y.H. Kanitkar's dissertation at <https://d.lib.msu.edu/etd/16667>.

### RIPARIAN SPIDERS INDICATE THE MAGNITUDE AND SOURCES OF POLYCHLORINATED BIPHENYL (PCB) CONTAMINATION AT A LARGE CONTAMINATED SEDIMENT SITE

Walters, D.M., R.R. Otter, J.M. Kraus, and M.A. Mills.  
Environmental Toxicology and Chemistry [Published online 21 Jun 2018 ahead of print]

Following remedial dredging, researchers investigated PCB contamination at the Ashtabula River Area of Concern (AOC) using araneid and tetragnathid spiders. PCB concentrations remain elevated in the area compared to reference conditions. Patterns of contamination were strikingly similar between taxa, but were higher in tetragnathids at the most contaminated sites. Spider PCB homolog distributions identified two PCB sources to the AOC. Based on these findings, recommendations are made regarding situations where these taxa can be used singularly, in concert, or combined into a composite spider sample to assess environmental contamination.

### THE VALUE OF USING MULTIPLE METRICS TO EVALUATE PCB EXPOSURE

Archer, M.C., A.D. Harwood, S.A. Nuttle, K.E. Huff Hartz, M.A. Mills, J.E. Garvey, and M.J. Lydy.  
Archives of Environmental Contamination and Toxicology 74(3):361-371(2018)

At a small lake contaminated with PCBs, multiple metrics were utilized to evaluate exposure to multiple trophic levels as well as contaminant transport within and outside the lake. The PCBs were localized to sediments in one area of the lake that served as the source of PCBs to aquatic invertebrates, emerging insects, and fish and terrestrial spiders in the riparian ecosystem. The Tenax extractable and biota PCB concentrations indicated tissue concentrations were localized to benthic invertebrates and riparian spiders in a specific cove, whereas fish data showed that fish

throughout the lake had PCB tissue concentrations, leading to wider exposure risk. The inclusion of PCB exposure measures at several trophic levels provided multiple lines of evidence to the scope of exposure through the aquatic and riparian food web, which aided in assessing risk and developing potential future remediation strategies. <https://aquatictox.siu.edu/wp-content/uploads/2018/07/Archer-PCB-campus-lake-Archives-2018.pdf>

#### EVALUATION OF PASSIVE SAMPLING POLYMERS AND NON-EQUILIBRIUM ADJUSTMENT METHODS IN A MULTI-YEAR SURVEILLANCE OF SEDIMENT POREWATER PCBs

Sanders, J.P., N.A. Andrade, and U. Ghosh.  
Environmental Toxicology and Chemistry [Published online 5 Jul 2018 ahead of print]

Several different methods of accounting for passive sampler nonequilibrium using performance reference compounds (PRCs) have been proposed, and this study explores the practical impacts of these methods in an applied context using results from a multi-year passive sampling surveillance of PCB concentrations in sediment pore water at a contaminated marsh amended with activated carbon (AC) sorbent materials. In a series of five sampling events spanning almost two yr, polyoxymethylene and polyethylene samplers were deployed and pore water concentrations were calculated with five different PRC adjustment methods. The results provide a basis for evaluating amendment performance by showing reductions of 34-97% in amended sediment pore water concentrations. They also provide a quantitative underpinning for discussions of the differences between sampling polymers, selection of PRCs, generation of high-resolution vertical profiles of pore water concentrations, and a comparison of PRC adjustment methods. For unamended sediment, older methods based on first-order kinetics agreed well with a recently developed method based on diffusion into and out of sediment beds; however, the sediment diffusion method did not work well for the AC-amended sediments.

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

Sanders, J.P., N.A. Andrade, C.A. Menzie, C.B. Amos, C. Gilmour, E.A. Henry, S.S. Brown, U. Ghosh.  
Environmental Toxicology and Chemistry [Published online 5 Jun 2018 ahead of print]

A multi-year, pilot-scale field investigation was conducted to measure the persistence and efficacy of activated carbon (AC) amendments to reduce the bioavailability of PCBs in an intertidal *Phragmites* marsh. The amendments tested were granular AC (GAC), GAC with a layer of sand, and a pelletized fine AC. Key metrics presented include vertically resolved black carbon concentrations in sediment and PCB concentrations in sediment, pore water, and several invertebrate species. Despite the turbulence that accompanied Hurricane Sandy in fall 2012, all three amendments remained in place for the duration of the study, successfully reducing pore water PCB concentrations by 34-97%. Reductions in invertebrate bioaccumulation were observed in all amendment scenarios, with pelletized fine AC producing the most pronounced effect. The findings can be used to inform amendment design, delivery, and monitoring at other contaminated sediment sites.

#### STABILITY OF MERCURY CONCENTRATION MEASUREMENTS IN ARCHIVED SOIL AND PEAT SAMPLES

Navratil, T., D.A. Burns, T. Novakova, J. Kana, J. Rohovec, M. Roll, and V. Ettler.  
Chemosphere 208:707-711(2018)

Archived soil samples can provide important information on the history of environmental contamination, and by comparison with recently collected samples, temporal trends can be inferred. Little previous work has addressed whether Hg concentrations in soil samples are stable with long-term storage under standard lab conditions. In this study, researchers re-analyzed a set of archived soil samples that ranged from relatively pristine mountainous sites to a polluted site near a non-ferrous metal smelter with a wide range of Hg concentrations (6-6485 µg/kg). Samples included organic and mineral soils and peats with a carbon content that ranged from 0.2 to 47.7%. Soil samples were stored in polyethylene bags or bottles and held in lab rooms where temperature was not kept to a constant value. Hg concentrations in four subsets of samples were originally measured in 2000, 2005, 2006, and 2007, and re-analyzed in 2017, i.e., after 17, 12, 11, and 10 years of storage. Statistical analyses of either separated or lumped data yielded no significant differences between the original and current Hg concentrations. Based on the analyses, results show that archived soil and peat samples can be used to evaluate historical soil Hg contamination.

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

Gidley, P.T., J.P. Kreitinger, M. Zakikhani, and B.C. Suedel.  
ERDC/EL TR-17-19, 59 pp, 2017

The placement of dredged material for creating vegetated shallow water aquatic habitat is being assessed for changes in long-term bioavailability of Hg to wildlife and humans. The three models used in this study (HERMES, WASP, and SERAFM) were applied in different ways to explore the strengths of each model, rather than to make direct comparisons between them. The HERMES model, which was most explicitly changed to account for aquatic plant growth, showed the greatest increases in sediment methylmercury (MeHg). The WASP model, which was most likely simulating a situation where dredged material is placed and aquatic plants do not grow, showed the least overall changes in surface water and sediment MeHg. The SERAFM model, which had the least flushing of the surface water in the restored scenario, showed the greatest increases in surface water MeHg (despite entered reductions in sediment Hg). This study focused on the usefulness of each of the models separately for their ability to predict long-term MeHg changes in sediment, sediment pore water, surface water (including suspended particulates), and dissolved-in surface water after the creation of shallow water habitat, relative to a "no-action" scenario at the site. <https://usace.contentdm.oclc.org/digital/api/collection/p266001coll1/id/5916/download>

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

Peterson, M.J., M.A. Mayes, S.C. Brooks, T.J. Mathews, A. Johns, L. Genez Rodriguez, et al.  
ORNL/TM-2017/480, 85 pp, 2018

A major emphasis in 2017 of the ORNL technology development studies for mercury cleanup was on field characterization and obtaining a watershed-scale understanding. Task 1, Soil and Groundwater Source Control, focused on addressing downstream Hg sources to the creek (especially floodplain and bank soils) and groundwater. Task 2, Surface Water and Sediment Manipulation, centered on potential manipulation of in-stream processes, such as water and sediment chemistry factors that affect Hg methylation. Task 3, Ecological Manipulation, investigated methods to manipulate the food chain at both lower and higher levels of organization to decrease Hg concentrations in fish. Together, the three study tasks focused on manipulating the key factors that affect Hg concentrations in fish, i.e., the amount of inorganic Hg available to the ecosystem, conversion of inorganic Hg to methylmercury (MeHg), and bioaccumulation of MeHg through the food web. <https://www.epa.gov/serafm/purd/1460231>

## General News

#### QUANTIFYING NANOPARTICLE RELEASE FROM NANOTECHNOLOGY — SCIENTIFIC OPERATING PROCEDURE SERIES: SOP-C-3

Martin, D.P., A.R. Poda, and A.J. Bednar.  
ERDC/EL SR-17-1, 26 pp, 2017

Material that is released from nanotechnology during testing can be a complex mixture of nanoparticles, dissolved species, matrix-embedded particles, and particles with sizes outside the nano range. Thorough characterization of the released material is crucial to predicting its toxicity. This report provides a general framework for determining not only whether material is released from a nanotechnology during testing but also whether the released material can still be considered a nanomaterial. The framework is written in broad terms so that it theoretically can be applied to any material, but references are provided for documents specific to the more common nanomaterials and detection methods. This document is intended for use in conjunction with previously established methods and procedures to help guide the user through the characterization process following release testing of a nanotechnology. <https://usace.contentdm.oclc.org/digital/api/collection/p266001coll1/id/4224/download>

#### APPLICATION OF TOXICITY IDENTIFICATION AND EVALUATION PROCEDURES FOR DREDGED MATERIAL MANAGEMENT

Kreitinger, J.P., J.D. Farrar, and G.R. Lotufo.  
ERDC TN-DOER-R25, 9 pp, 2017

The U.S. Army Corps of Engineers is required to evaluate direct, indirect, and cumulative environmental impacts associated with managing dredged material, including the potential for release of contaminants at disposal sites. This technical note provides background on EPA's Toxicity Identification and Evaluation procedures, their use within the multi-step dredged material evaluation process, and their application to decision-making under the Upland Testing, Inland Testing, and Ocean Disposal manuals. <https://usace.contentdm.oclc.org/digital/api/collection/p266001coll1/id/4181/download>

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

U.S. EPA, Federal Facilities Restoration & Reuse Office, Office of Land & Emergency Management.  
EPA 505-R-17-001, 14 pp, 2017

In addition to military installations, federal facilities encompass former nuclear weapon complexes, abandoned mines, and landfills. Types of contamination include radioactive waste, munitions and unexploded ordnance, mining waste, fuels and solvents. There are 174 facilities on the National Priorities List, and EPA is responsible for overseeing their cleanup under the Superfund law. This brochure highlights program achievements. <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100TF8H.txt>

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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