

# Technology Innovation News Survey

Entries for May 16-31, 2016

## Market/Commercialization Information

### REMEDIAL ACTION: MADISON COUNTY MINES SUPERFUND SITE, OU5 CATHERINE MINES & SKAGGS TAILINGS SUBSITES

U.S. EPA, Office of Acquisition Management, Region VII, Lenexa, KS.  
Federal Business Opportunities, FBO-5313, Solicitation SOL-R7-16-00012, 2016

EPA Region 7 is seeking the services of an experienced firm to provide remedial action services for OU5-Catherine Mines and Skaggs Tailings subsites. The two mine waste piles will be constructed according to the design and capped with clean soil. Downstream floodplain sediment will be removed, and sediment traps will be located downstream in locations where sediment removal is not practical. Remediation will be conducted pursuant to CERCLA and NCP requirements. EPA anticipates issuing an indefinite-delivery requirements-type contract consisting of a one-year base period and a one-year option period with an estimated value between \$5M to \$10M. This procurement will be 100% set-aside for service-disabled veteran-owned small businesses (SDVOSB) under NAICS code 562910. Proposals are due by 5:00 PM ET on August 1, 2016. <https://www.fbo.gov/spg/EPA/OAM/ReqVII/SOL-R7-16-00012/listing.html> See more on FedConnect at <https://www.fedconnect.net/FedConnect/?doc=SOL-R7-16-00012&agency=EPA> [Note: It might be necessary to copy and paste the URL into your browser for direct access.].

### SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS (SDVOSB) SET-ASIDE IDIQ FOR A-E SERVICES WITHIN THE NORTHWESTERN DIVISION (MEGA PHASE B)

U.S. Army Corps of Engineers, USACE District, Seattle, WA.  
Federal Business Opportunities, FBO-5327, Solicitation W912DW-16-0107, 2016

This announcement constitutes a request for SF330s as a set-aside for service-disabled veteran-owned small businesses (SDVOSB) under NAICS code 541330. The USACE Northwestern Division (NWD) has a requirement for A-E Hazardous, Toxic, and Radioactive Waste (HTRW)/environmental indefinite-delivery contracts for execution of its environmental mission. The majority of the work will be located in NWD (including Kansas City, Omaha, and Seattle Districts) with a maximum ordering amount of \$6M over the life of the contract. Each contract will include a base period of three years and two one-year options. Firm-fixed-price-type task orders will be issued as the need arises during the contract ordering period. Selected firms will work on a variety of hazardous waste and other environmental projects, including but not limited to contaminated soil and groundwater, contaminated sediments, radioactive and mixed wastes, underground storage tanks and fueling systems, and habitat restoration and mitigation. SF330 packages must be received by 2:00 PM PT on July 22, 2016. <https://www.fbo.gov/spg/USA/COE/DACA67/W912DW-16-0107/listing.html>

### BROAD AGENCY ANNOUNCEMENT: OIL THICKNESS SENSOR

Department of the Interior, Bureau of Safety and Environmental Enforcement (BSEE).  
Federal Business Opportunities, FBO-5325, Solicitation E16PS00099, 2016

The purpose of this BAA is to fund development and testing of a sensor that can be mounted to an oil recovery skimmer or deployed easily (e.g., from a vessel or via aircraft) in the area of an oil skimming operation to measure the thickness of various crude and refined oils on water and to communicate thickness information wirelessly in near-real time. The sensor must have the following abilities: (1) measure a wide range of oil thicknesses (e.g., threshold level of 1 mm to 75 mm in 3-5 mm increments); (2) measure multiple types of crude and refined oils; (3) communicate thickness and location data remotely in near-real time; (4) mitigate erroneous readings due to fouling; and (5) withstand environmental conditions, such as exposure to salt water, temperature extremes (-20 to 200 degrees F), and UV. Each proposal also should discuss likely commercial and maintenance costs; sensor lifetime; design for wave conditions; sensor housing or deployment/retrieval; and anticipated technology readiness level at end of prototype test. BSEE anticipates that a total of \$515,000 will be available for a one-year award made in late summer 2016. The prototype will be considered a deliverable to be retained by BSEE at the end of the contract. Proposals are due by 2:00 PM ET on August 15, 2016. <https://www.fbo.gov/notices/96ebf08c4a71bb3eb4cadbc3990abe08>

### MUNITIONS RESPONSE ACTION SERVICES VIEQUES, PUERTO RICO

Naval Facilities Engineering Command, NAVFAC Atlantic, Norfolk, VA.  
Federal Business Opportunities, FBO-5328, Solicitation N6247015R8000, 2016

The Government intends to award a cost-plus-award-fee IDIQ contract for one base year and four one-year option periods as a total small business set-aside, NAICS code 562910, with a maximum value of \$95M. Although Munitions Response Action Services will be performed predominately at former Navy facilities on Vieques, work also may be performed at other sites located anywhere else as required by the Government. Munitions response actions may include investigations, removal actions, and remedial actions in terrestrial areas (on or beneath the land surface) or aquatic environments (marsh areas, surf zones, intertidal areas, or other under water areas), as well as working with other Navy support or oversight contractors. The solicitation will be issued on or about July 15, 2016. <https://www.fbo.gov/spg/DON/NAVFAC/N62470CON/N6247015R8000/listing.html>

## Cleanup News

### 15 YEARS LATER: TREE-ASSISTED CREOSOTE REMEDIATION AT THE FORMER TENNESSEE RAILROAD RAIL-TIE YARD IN ONEIDA, TENNESSEE

Harding, B.J., S.R. Aufdenkampe, M.A. Widdowson, and J.T. Novak.  
The 17th Railroad Environmental Conference, 27-28 October 2015, Urbana, IL. Abstract only, 2015

Twenty-five years after the discovery of creosote NAPL venting to a surface waterbody at a legacy rail-tie yard (Oneida, Tenn.), no further action is required. Successful on-site remediation was accomplished primarily through bulk contaminant mass removal (~1,147 tons of creosote-impacted soil) and secondarily by natural attenuation of target petroleum hydrocarbons facilitated through processes of rhizodegradation and phytovolatilization. To address residual contamination following soil excavation, over 1,200 hybrid poplar trees were planted in 1997-1998 for hydraulic control of dissolved-phase constituents and to enhance natural biodegradation. Final performance monitoring was conducted in 2015 to round off a well-documented case study spanning 15 years of applied tree-assisted creosote remediation. **Longer abstract:** [http://railtec.illinois.edu/RREC/pdf/RREC%202015%20present/46\\_Harding.pdf](http://railtec.illinois.edu/RREC/pdf/RREC%202015%20present/46_Harding.pdf)

### PATHWAY TO CLOSURE AT SITES WITH LNAPL: A CASE STUDY

Smith, J., L. Alkidas, C. Barton, N. Ferrone, D. Dyer, and S. Aufdenkampe.  
The 17th Railroad Environmental Conference, 27-28 October 2015, Urbana, IL. 14 slides, 2015

In the State of Michigan, changes in LNAPL rules have shifted focus away from determining whether or not LNAPL is present to understanding and managing LNAPL risks. A case study outlines site characterization efforts and the development of an effective LNAPL management strategy at an active rail yard in southeast Michigan. The case study is an example of how a technically sound LNAPL conceptual site model may inform LNAPL site management strategies under the new risk-based regulatory rules in Michigan.

**Slides:** [http://railtec.illinois.edu/RREC/pdf/2015%20RREC/54\\_Smith.pdf](http://railtec.illinois.edu/RREC/pdf/2015%20RREC/54_Smith.pdf)  
**Longer abstract:** [http://railtec.illinois.edu/RREC/pdf/RREC%202015%20present/53\\_Smith.pdf](http://railtec.illinois.edu/RREC/pdf/RREC%202015%20present/53_Smith.pdf)

#### ESTIMATING NATURAL SOURCE ZONE DEPLETION RATES FROM SUBSURFACE TEMPERATURE DATA

Smith, J., T. Wippold, and B. Koons.

The 17th Railroad Environmental Conference, 27-28 October 2015, Urbana, IL. 14 slides, 2015

The biologically mediated natural source-zone depletion (NSZD) processes that destroy hydrocarbons and alter the composition of soil gas (e.g., consume oxygen and produce carbon dioxide) also release heat and create subsurface temperature anomalies above the natural soil temperature profile. Recent research has focused on measuring temperature in and around LNAPL-affected areas and characterizing areas of warmer temperature associated with exothermic NSZD processes. NSZD is being used to establish performance-based remedial endpoints for an existing LNAPL recovery system at an active rail yard. LNAPL is present at depths >300 ft bgs, and subsurface stratigraphy is complex, containing caliche in the unsaturated zone. Given the technical and economic challenges associated with conventional methods for determining NSZD rates, a temperature-based NSZD evaluation was implemented. The presentation illustrates equipment, methodology, and results of the assessment, with a description of the model used to calculate heat flux and, correspondingly, the rate of hydrocarbon degradation responsible for generating excess heat in the subsurface.

**Slides:** [http://railtec.illinois.edu/RREC/pdf/2015%20RREC/52\\_Smith.pdf](http://railtec.illinois.edu/RREC/pdf/2015%20RREC/52_Smith.pdf)

**Longer abstract:** [http://railtec.illinois.edu/RREC/pdf/RREC%202015%20present/51\\_Smith.pdf](http://railtec.illinois.edu/RREC/pdf/RREC%202015%20present/51_Smith.pdf)

#### OBTAINING A REMEDIATION CERTIFICATE USING A MULTIFACETED APPROACH TO SITE CLEANUP: CASE STUDY

Sturm, H.

RemTech 2015: Remediation Technologies Symposium, 22 slides, Presentation 54, 2015

After operation of a multi-phase extraction system (2000-2005) for petroleum hydrocarbons (PHCs) proved insufficiently effective for remediation of PHC impacts at a manufacturing facility in Calgary, Alberta, the new cleanup strategy had to accommodate a requirement for remediation of contamination present within low permeability soils to be completed in a short timeframe (~2 years) during active facility operations. Additional remedial plans were developed, an application for Tier 2 Remediation Criteria was completed, and the site-specific criteria were approved in 2010. Soil and groundwater sampling was completed in between various steps of the remediation process to support optimization of the remedial plan. The new cleanup approach included environmental fracturing for permeability enhancement and amendment emplacement, surfactant treatment, permeation injection of oxidants, limited soil excavation, and installation of oxidant treatment canisters and oxygen diffusers. Successful site remediation was completed within the 2-year timeframe to below the site-specific Tier 2 remediation criteria, and the site was granted a Remediation Certificate in 2014.

**Slides:** <http://www.esaa.org/wp-content/uploads/2015/10/15-Strum.pdf>

**Longer abstract:** <http://www.esaa.org/wp-content/uploads/2015/09/2015Abstracts-54.pdf>

#### RAPID THERMALLY ENHANCED DEGRADATION OF METHYLENE CHLORIDE AT A SPILL SITE IN THE UK

Dablow, J., J. Baldock, K. Johnson, and J. Pennell.

RemTech 2015: Remediation Technologies Symposium, 22 slides, Presentation 54, 2015

Following accidental release of about 15,000 kg of methylene chloride due to pipework failure at an active manufacturing facility, a remedial options appraisal showed steam-enhanced vapor extraction to be the most technically appropriate, rapid, and sustainable solution to achieve the project objectives. While this technology is relatively energy intensive, it has previously been shown to have a lower carbon footprint and associated cost than longer-term alternatives, such as pump and treat. The treatment area affected by methylene chloride was heated in zones. During heating of the first area the contractor found that contrary to expectations at the start of the project, degradation mechanisms were likely to be the dominant contaminant mass reduction mechanisms rather than mass transfer via volatilization, as is typical for in situ thermal projects. Subsequently, target temperatures in other parts of the treatment area were lowered to temperatures enabling degradation reactions to occur.

**Slides:** <http://www.esaa.org/wp-content/uploads/2015/10/15-Dablow.pdf>

**Longer abstract:** <http://www.esaa.org/wp-content/uploads/2015/09/2015Abstracts-61.pdf>

## Demonstrations / Feasibility Studies

#### A LARGE-SCALE FIELD TRIAL OF THIN-LAYER CAPPING OF PCDD/F-CONTAMINATED SEDIMENTS: SEDIMENT-TO-WATER FLUXES UP TO 5 YEARS POST-AMENDMENT

Cornelissen, G., M. Schaanning, J.S Gunnarsson, and E. Eek.

Integrated Environmental Assessment and Management, Vol 12 No 2, 216-221, 2016

The longer-term effect (3-5 yr) of thin-layer capping on in situ sediment-to-surface-water fluxes was monitored in a large-scale field trial in the PCDD/F contaminated Grenlandfjords, Norway, in 4 trial plots of 10,000-40,000 m<sup>2</sup> at 30-100 m water depth. Active caps (2.5 cm thickness) of dredged clean clay amended with powdered activated carbon (PAC) were placed in 2 fjords. The active caps were compared to 2 nonactive clay or crushed limestone caps in one of the fjords (5 cm thickness). Sediment-to-water PCDD/F fluxes were measured in situ in diffusion chambers. During the first 2 years after thin-layer capping, flux reductions relative to noncapped reference fields were more extensive at the fields capped with nonactive caps (70-90%) than at the ones with PAC-containing caps (50-60%); however, between 3 and 5 years after thin-layer capping, the trend reversed and cap effectiveness in reducing fluxes increased to 80-90% for the PAC caps and decreased to 20-60% for the nonactive caps. The increasing effectiveness over time of PAC-containing active caps is explained by a combination of slow sediment-to-PAC mass transfer of PCDD/Fs and bioturbation by benthic organisms. The decreasing effectiveness of nonactive limestone and clay caps is explained by deposition of contaminated particles atop the caps. Present field data indicate that the capping efficiency of thin PAC-enriched caps can improve over time due to slow diffusive PCDD/F transfer from sediment to PAC particles and better mixing of the PAC by bioturbation.

#### USE OF REACTIVE MINERALS TO REMEDIATE CHLORINATED SOLVENTS IN GROUNDWATER AT A LOCOMOTIVE REPAIR SHOP

Bartz, C., B. Christian, and M. Zenker.

The 17th Railroad Environmental Conference, 27-28 October 2015, Urbana, IL. Abstract only, 2015

Groundwater beneath a former locomotive repair shop at an active rail yard in Battle Creek, Michigan, is affected by chlorinated aliphatic hydrocarbons (CAHs), including PCE and TCE, at relatively low concentrations (up to ~130 µg/L) but above cleanup criteria. After assessing site sampling data, the contractor performed a 9-month pilot test from August 2013 through April 2014 to determine if reactive minerals could be created artificially with subsequent degradation of CAHs by injecting a labile carbon source (fructose corn syrup) and additional sulfate (magnesium sulfate) into the source area, which already contained significant amounts of iron. A single injection event was performed in August 2013. Pre- and post-injection groundwater samples were analyzed for CAHs, ferrous and ferric iron, sulfate, sulfide, dissolved gases, dechlorinating bacteria, and functional genes. Pre- and post-injection soil samples were analyzed for strong acid soluble iron, acid volatile sulfides, and minerals. The pilot results, performed to assess the potential to create reactive minerals, indicate that conditions for formation of reactive minerals were enhanced and reductive dechlorination was stimulated. Post-injection analytical data suggest the involvement of both biotic and abiotic mechanisms in CAH concentration reductions. The predominant mechanism for degradation was biotic degradation, although abiotic degradation processes likely were also occurring. Chlorinated ethanes were nearly completely degraded and chlorinated ethenes were partially dechlorinated after one injection event.

**Longer abstract:** [http://railtec.illinois.edu/RREC/pdf/RREC%202015%20present/48\\_Bartz.pdf](http://railtec.illinois.edu/RREC/pdf/RREC%202015%20present/48_Bartz.pdf)

## Research

#### SIMULATING THE UNCERTAIN EFFECT OF ACTIVE CARBON CAPPING OF A DIOXIN-POLLUTED NORWEGIAN FJORD

Starrfelt, J. and T.M. Saloranta.

Integrated Environmental Assessment and Management, Vol 11 No 3, 481-489, 2015

An updated fugacity-based environmental fate model was set up to simulate the historical fate of PCDD/Fs in the Grenland fjords, Norway. The model was parameterized using Bayesian inference and then used to simulate the effect of capping parts of the polluted sediments with active carbon. Great care was taken in quantifying the uncertainty regarding the efficacy of the activated carbon cap to reduce the leaching of contaminants from the sediments. The model predicts that by capping selected parts of the fjord, biota will be classified as moderately polluted approximately a decade earlier than a natural remediation scenario. The approach illustrates the importance of incorporating uncertainty in local remediation efforts, as the biotic concentrations scale nonlinearly with remediation effort. <https://starrfelt.files.wordpress.com/2015/04/ieam1617.pdf>

#### **IDENTIFICATION OF A RUMINOCOCCACEAE SPECIES AS THE METHYL TERT-BUTYL ETHER (MTBE) DEGRADING BACTERIUM IN A METHANOGENIC CONSORTIUM**

Liu, T., H. Ahn, W. Sun, L.R. McGuinness, L.J. Kerkhof, and M.M. Haeggbloom.  
Environmental Science & Technology, Vol 50 No 3, 1455-1464, 2016

Research to identify the organisms that actively degrade MTBE was conducted using an anaerobic methanogenic culture enriched with MTBE as the sole carbon source from New Jersey Arthur Kill intertidal strait sediment. The cultures were analyzed using stable isotope probing (SIP) combined with terminal restriction fragment length polymorphism, high-throughput sequencing, and clone library analysis of bacterial 16S rRNA genes. The sequence data indicated a predominance of phylotypes belonging to the *Ruminococcaceae* in the *Firmicutes* in the methanogenic cultures. SIP experiments also showed sequential incorporation of C-13-labeled MTBE by the bacterial community with a bacterium most closely related to *Saccharofermentans acetigenes*. Identification of the microorganisms responsible for the activity will improve general understanding of anaerobic MTBE degradation processes in the field and determine biomarkers for monitoring natural attenuation. *Earlier work on this research is available in W. Sun's dissertation at* <https://etd.lib.msu.edu/islandora/object/etd%3A1224/datastream/OBJ/view>.

#### **IMAGING PATHWAYS IN FRACTURED ROCK USING THREE-DIMENSIONAL ELECTRICAL RESISTIVITY TOMOGRAPHY**

Robinson, J., L. Slater, T.B. Johnson, A.M. Shapiro, C. Tiedeman, D. Ntlargiannis, C.D. Johnson, et al.  
Groundwater, Vol 54 No 2, 186-201, 2016

Researchers used 3-D cross-borehole electrical resistivity tomography (ERT) in a 9 m (diameter) x 15 m well field to capture high-resolution flow and transport processes in a fractured mudstone contaminated by chlorinated solvents, primarily TCE. Conductive (sodium bromide) and resistive (deionized water) injections were monitored in seven boreholes. Electrode arrays with isolation packers and fluid sampling ports were designed to enable acquisition of ERT measurements during pulsed tracer injections. Fracture zone locations and hydraulic pathways inferred from hydraulic head drawdown data were compared with electrical conductivity distributions from ERT measurements. Static ERT imaging has limited resolution to decipher individual fractures; however, these images showed alternating conductive and resistive zones, consistent with alternating laminated and massive mudstone units at the site. Tracer evolution and migration was clearly revealed in time-lapse ERT images and supported by in situ borehole vertical apparent conductivity profiles collected during the pulsed tracer test. While water samples provided important local information at the extraction borehole, ERT delineated tracer migration over spatial scales, capturing the primary hydrogeological heterogeneity controlling flow and transport. The fate of the tracer injections at this scale could not have been quantified using borehole logging and/or borehole sampling methods alone.

*For additional information, see J. Robinson's Ph.D. thesis at* <https://rucore.libraries.rutgers.edu/rutgers-lib/47707/> *and a conference paper at*

<http://www.ncas.rutgers.edu/advancing-electrical-geophysical-characterization-dnapl-contaminated-fractured-rock-aquifers-may-201>.

#### **ACTIVATED CARBON AMENDMENTS FOR SEDIMENT REMEDIATION: REDUCTION OF AQUATIC AND BIOTA CONCENTRATIONS OF PCBs, AND SECONDARY EFFECTS ON LUMBRICULUS VARIEGATUS AND CHIRONOMUS RIPARIUS**

Nybom, Inna, Ph.D. dissertation, Publications of the University of Eastern Finland, No. 200, 94 pp, 2015

In studies of the sorption efficiency of activated carbon (AC) for PCBs and the secondary effects of AC on benthic organisms *Lumbriculus variegatus* and *Chironomus riparius*, results show that the sorption efficiency and the secondary effects are dependent on sediment characteristics, highlighting the importance of site-specific evaluation when remedial actions are designed. Adverse effects were seen on growth (*L. variegatus* and *C. riparius*), reproduction, and survival (*C. riparius*), and the responses were dose- and particle size-dependent. AC is an efficient sorbent, and it may bind nutrients concurrently with contaminants, thus reducing the quality of the sediment for benthic organisms. [http://epublications.uef.fi/pub/urn\\_isbn\\_978-952-61-1979-3/urn\\_isbn\\_978-952-61-1979-3.pdf](http://epublications.uef.fi/pub/urn_isbn_978-952-61-1979-3/urn_isbn_978-952-61-1979-3.pdf)

#### **POSITIONING ACTIVATED CARBON AMENDMENT TECHNOLOGIES IN A NOVEL FRAMEWORK FOR SEDIMENT MANAGEMENT**

Kupryianchyk, D., M.I. Rakowska, D. Reible, J. Harmsen, G. Cornelissen, M. van Veggel, et al.  
Integrated Environmental Assessment and Management, Vol 11 No 2, 221-234, 2015

A great deal of attention has been paid to the technical and ecological features and implications of sediment remediation with activated carbon (AC), although science in this field still is rapidly evolving. This paper provides a review of these features in the recent literature and a comparison of sediment remediation with AC to other sediment management options, emphasizing their full-scale application. Beginning with a qualitative overview of advantages of current alternatives to remediate contaminated sediments, the subsequent critical review of AC treatment technology includes current understanding of the effectiveness and ecological safety for AC use in natural systems.

#### **EVALUATION OF SORBING AMENDMENTS FOR IN-SITU REMEDIATION OF CONTAMINATED SEDIMENTS**

Azhar, Wardah, Ph.D. dissertation, University of Texas at Austin, 187 pp, 2015

Laboratory sorption tests with different sorbents (five types of clays and four types of carbon-based sorbents) were conducted to screen potential sorbent materials for treatment of hydrophobic organic and selected inorganic contaminants common to sediments. The screening studies were used as a basis to evaluate an in situ adsorptive remedy for the Manistique Harbor and River Superfund site in Michigan. Evaluation of the sorption capacity of five PCBs on granular activated carbon (GAC) and organophilic clay (OMC) and the influence of natural organic matter (NOM) showed that NOM fouling reduced GAC performance by about half an order of magnitude while having minimal effect on OMC. Measured performance of the sorbents was used to evaluate in situ treatment and capping remedial designs under conditions of weak (1 cm/yr) and rapid (1 cm/day) upwelling flow. Amended capping where the cap material was mixed throughout a thick cap layer provided the best performance, followed by capping in a thin layer, followed by use of amendments as an in situ treatment. <https://repositories.lib.utexas.edu/handle/2152/32524>

#### **INTEGRATED RISK AND RECOVERY MONITORING OF ECOSYSTEM RESTORATIONS ON CONTAMINATED SITES**

Hooper, M.J., S.J. Glomb, D. Harper, T.B. Hoelzle, L.M. McIntosh, and D.R. Mulligan.  
Integrated Environmental Assessment and Management, Vol 12 No 2, 284-295, 2016

Monitoring restoration progress provides data critical to minimizing residual contaminant risk and uncertainty while measuring ecological advancement toward recovery goals. A detailed assessment of the completed project's achievements, as well as unrealized objectives attained through project monitoring, will determine if contaminant risk has been minimized, injured resources have recovered, and ecosystem services have been returned. *This paper is Open Access at* <http://onlinelibrary.wiley.com/enhanced/doi/10.1002/ieam.1731>.

#### **REMOVAL OF A CHLORINATED VOLATILE ORGANIC COMPOUND (PERCHLOROETHYLENE) FROM THE AQUEOUS PHASE BY ADSORPTION ON ACTIVATED CARBON**

Miguet, M., V. Goetz, G. Plantard, and Y. Jaeger

For treating PCE-contaminated groundwater, small particle sizes and full-scale granular activated carbon (GAC) were tested in a fixed-bed column packed with GAC. Adsorption capacity decreased with increasing particle size in the presence of natural organic matter. Columns running in dynamic-mode PCE in-feed were used to test three operating conditions. Sampling along the columns was used to monitor PCE concentration in the liquid phase at different column lengths, yielding a large data set for a mathematical model based on mass balance of PCE to predict the adsorption dynamics under various operating conditions. The model was reliable and accurate over the whole data set. The fixed-bed performance was evaluated in terms of operation time, total volume of decontaminated water, and degree of GAC utilization.

#### **1DTEMPPRO V2: NEW FEATURES FOR INFERRING GROUNDWATER/SURFACE-WATER EXCHANGE**

Koch, F.W., E.B. Voytek, F.D. Day-Lewis, R.W. Healy, M. Briggs, J.W. Lane, Jr., and D. Werkema.  
Groundwater Monitoring & Remediation, Vol 54 No 3, 434-439, 2016

A new version of the computer program 1DTempPro extends the original code to include new capabilities for (1) automated parameter estimation, (2) layer heterogeneity, and (3) time-varying specific discharge. The code serves as an interface to the U.S. Geological Survey model VS2DH and supports analysis of vertical 1-D temperature profiles under saturated flow conditions to assess groundwater/surface-water exchange and estimate hydraulic conductivity for cases where hydraulic head is known. *Additional information at <http://water.usgs.gov/oqw/bqas/1dtemppro/>.*

#### **GROUNDWATER GEOCHEMICAL AND SELECTED VOLATILE ORGANIC COMPOUND DATA, OPERABLE UNIT 1, NAVAL UNDERSEA WARFARE CENTER, DIVISION KEYPORT, WASHINGTON, JULY 2015**

Huffman, R.L.  
U.S. Geological Survey Data Series 998, 64 pp, 2016

This report presents groundwater geochemical and selected CVOC data collected at Operable Unit 1 by USGS during July 2015 in support of long-term monitoring for natural attenuation. Concentrations of redox-sensitive constituents measured at all wells and piezometers were consistent with those measured in previous years, with dissolved oxygen concentrations all <https://pubs.er.usgs.gov/publication/ds998>

#### **ASSESSING ATMOSPHERIC CONCENTRATION OF POLYCHLORINATED BIPHENYLS (PCBS) BY EVERGREEN RHODODENDRON MAXIMUM NEXT TO A CONTAMINATED STREAM**

Viet D. Dang, David Walters, Cindy M. Lee  
Environmental Toxicology and Chemistry, [Online publication ahead of print] 2016

Scientists used *Rhododendron maximum* (rhododendron) growing next to a contaminated stream to assess atmospheric PCB concentrations. The study area was located in a rural setting ~2 km downstream of a former Sangamo-Weston (S-W) facility. Leaves from the same mature shrubs were collected in late fall 2010 and in winter and spring 2011. PCBs were detected in the collected leaves, suggesting that rhododendron can be used as air passive samplers in rural areas where active sampling is impractical. Estimated Sigma-PCB (47 congeners) concentrations in the atmosphere decreased from fall 2010 to spring 2011, with concentration means at 3990, 2850, and 931 pg/m<sup>3</sup> in fall 2010, winter 2011, and spring 2011, respectively. These results indicate that the atmospheric concentrations at this location continue to be high despite termination of active discharge from the former S-W plant. Leaves had a consistent pattern of high concentrations of tetra- and penta-CBs similar to the congener distribution in polyethylene passive samplers deployed in the water column, suggesting that volatilized PCBs from the stream were the primary source of contaminants in rhododendron leaves. *See additional information on this study in V. Dang's dissertation at [http://tigerprints.clemson.edu/all\\_dissertations/885/](http://tigerprints.clemson.edu/all_dissertations/885/).*

#### **HEAVY METAL DISTRIBUTION IN A SEDIMENT PHYTOREMEDIATION SYSTEM AT PILOT SCALE**

Doni, S., C. Macci, E. Peruzzi, R. Iannelli, and G. Masciandaro.  
Ecological Engineering, Vol 81, 146-157, 2015

In a study of phytoremediation for the decontamination of contaminated dredged marine sediments, researchers investigated the synergic action of different plant species and compost in removing heavy metals (Cd, Ni, Zn, Pb, and Cu) and total petroleum hydrocarbons. A complete picture of metals flux was obtained by investigating metal mass-balance in the treated sediments. Metal distribution in the sediment phases was not uniform, and each metal predominated in different fractions. Cd, Zn, and Cu were the metals most easily translocated in both aboveground plant tissues and roots, confirming their higher bioavailability for the plants. At the end of the study, mass balance results showed high metal content remained in the sediment. The greatest contribution in metal containment was attributed to phytostabilization at rhizosphere level followed by gravel and sand absorption. The capacity of the rhizosphere to precipitate heavy metals could be considered as an alternative option for reducing metal bioavailability and consequently sediment toxicity.

#### **PERFORMANCE OF ROSE SCENTED GERANIUM (PELARGONIUM GRAVEOLENS) IN HEAVY METAL POLLUTED SOIL VIS-A-VIS PHYTOACCUMULATION OF METALS**

Chand, S., G. Singh, and D.D. Patra.  
International Journal of Phytoremediation, Vol 18 No 8, 754-760, 2016

The effect of heavy metal toxicity on growth, herb, oil yield and quality, and metal accumulation was investigated in rose-scented geranium (*Pelargonium graveolens*) grown in heavy metal-enriched soils. Four heavy metals (Cd, Ni, Cr, and Pb) each at two levels (10 and 20 mg/kg soil) were tested on geranium. Results indicated that Cr concentration in soil at 20 mg/kg reduced leaves, stem, and root yield by 70, 83, and 45%, respectively, over control. Cr-stressed soil had a significant effect on root growth. Nickel, Cr, and Cd concentration and accumulation in plants increased with higher application of these metals. Cr, Ni, and Cd uptake was observed to be higher in leaves than in stem and roots. Essential oil constituents generally were not affected significantly by heavy metals, although Pb at 10 and 20 ppm significantly increased the content of citronellol, and Ni at 20 ppm increased the content of geraniol. Given the higher accumulation of toxic metals by geranium and the minimal impact of heavy metals on essential oil quality, geranium can be commercially cultivated in heavy metal contaminated soil for production of high-value essential oil.

#### **PHYTOREMEDIATION POTENTIAL OF CADMIUM-CONTAMINATED SOIL BY EUCALYPTUS GLOBULUS UNDER DIFFERENT COPPICE SYSTEMS**

Luo, J., S. Qi, L. Peng, and X. Xie.  
Bulletin of Environmental Contamination and Toxicology, Vol 94 No 3, 321-325, 2015

The phytoremediation potential of *Eucalyptus globulus* in Cd-contaminated soil was evaluated through two different harvest methods. Although replanting is more expensive than coppicing and produces less aboveground biomass, more Cd was removed from the soil with roots removal at each harvest. Despite the higher cost of replanting, when phytoremediation efficiency and total duration are considered, replanting is recommended as an appropriate method for decreasing the phytoremediation time frame.

## **General News**

### **THE CLEAN WATER ACT AND SEDIMENT REMEDIATION: USING THE DATA QUALITY OBJECTIVES PROCESS TO HELP ASSURE THAT**

#### **REMIEDIATED SEDIMENT SITES ARE NOT RE-CONTAMINATED**

Association of State and Territorial Solid Waste Management Officials (ASTSWMO), 23 pp, 2016

This paper suggests a planning method to help identify possible sources of pollutants that might prevent a site from reaching remedial cleanup levels or remedial action objectives, or that might recontaminate the site following a successful remedial action. Coordination between the Clean Water Act and CERCLA programs regarding single outfalls, storm water, combined sewer outfalls, and watershed management issues that affect a contaminated sediment site can yield more efficient, effective, and sustainable remedies.

[http://astswmo.org/files/policies/CERCLA\\_and\\_Brownfields/2016\\_Sediments\\_DOO\\_Paper\\_FINAL.pdf](http://astswmo.org/files/policies/CERCLA_and_Brownfields/2016_Sediments_DOO_Paper_FINAL.pdf)

#### **SUPERFUND STATE CONTRACTS — A REFERENCE FOR STATES AND TERRITORIES: HOW TO GET THE MOST OUT OF YOUR SUPERFUND STATE CONTRACT**

Association of State and Territorial Solid Waste Management Officials (ASTSWMO), 36 pp, 2016

This paper is intended to help states recognize and understand decision points relevant to Superfund state contracts and provide some implementation strategies to assist with successful site cleanup. Prepared by the ASTSWMO Remedial Action Focus Group, the paper discusses statement of work, funding, state assurances, institutional controls, transition to O&M, and other considerations.

[http://astswmo.org/files/policies/CERCLA\\_and\\_Brownfields/2016\\_SSC\\_Guidance\\_FINAL.pdf](http://astswmo.org/files/policies/CERCLA_and_Brownfields/2016_SSC_Guidance_FINAL.pdf)

#### **FROM BIOAVAILABILITY SCIENCE TO REGULATION OF ORGANIC CHEMICALS**

Ortega-Calvo, J.-J., J. Harmsen, J.R. Parsons, K.T. Semple, M.D. Aitken, C. Ajao, C. Eadsforth, et al.

Environmental Science & Technology, Vol 49 No 17, 10255-10264, 2015

This article discusses bioavailability concepts and methods as well as possible pathways for the implementation of bioavailability into risk assessment and regulation. The authors also offer a simple, pragmatic, and justifiable approach for use within retrospective and prospective risk assessment. Downloaded from UvA-DARE, the institutional repository of the University of Amsterdam (UvA),

<http://hdl.handle.net/11245/2.170806>.

#### **ABSTRACT BOOK: SETAC EUROPE 25TH ANNUAL MEETING, 3-7 MAY 2015, BARCELONA, SPAIN**

Society of Environmental Toxicology and Chemistry Europe (SETAC Europe), 525 pp, 2015

The theme of the 25th annual SETAC meeting was "environmental protection in a multi-stressed world: challenges for science, industry and regulators." This book comprises the abstracts of the presentations for the platform and poster sessions of the 2015 meeting.

[https://www.setac.org/resource/resmgr/Abstract\\_Books/SETAC-Barcelona-abstracts.pdf](https://www.setac.org/resource/resmgr/Abstract_Books/SETAC-Barcelona-abstracts.pdf)

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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