

Technology Innovation News Survey

Entries for January 16-31, 2015

Market/Commercialization Information

2015 BROAD AGENCY ANNOUNCEMENT (BAA)

U.S. Army Corps of Engineers, USACE ITL, GSL, EL, CHL, Vicksburg, MS.
Federal Business Opportunities, FBO-4820, Solicitation W912HZ15BAA01, 2015

The U.S. Army Engineer Research and Development Center (ERDC) consists of the Coastal and Hydraulics Lab, the Geotechnical and Structures Lab, the Environmental Lab, and the Information Technology Lab in Vicksburg, MS; the Cold Regions Research and Engineering Lab in Hanover, NH; the Construction Engineering Research Lab in Champaign, IL; and the Geospatial Research Laboratory in Alexandria, VA. Topics such as treatment of hazardous waste and environmental issues for installations lie within the broad range of research areas that are of interest to ERDC. The BAA document posted at <http://erdc.usace.army.mil/> is open until superseded. Proposals may be accepted at any time. For answers to technical questions, contact the personnel listed at the end of each topic area. https://acquisition.army.mil/asfi/synopsis_attach_viewer.cfm?sollicitationnbr=W912HZ15BAA01&pseqnbr=513867&pnot_type=COMBINE

ANNUAL BROAD AGENCY ANNOUNCEMENT: FY15 ENVIRONMENTAL INITIATIVES FOR NAVAL FACILITIES ENGINEERING AND EXPEDITIONARY WARFARE CENTER

Naval Facilities Engineering Command, NAVFAC EXWC Port Hueneme, CA.
Federal Business Opportunities, FBO-4829, Solicitation N3943015R1639, 2015

This BAA for the Naval Facilities Engineering and Expeditionary Warfare Center (NEXWC) is open for one year from the date of publication, roughly until 2/11/16. Proposals may be submitted at any time during this period. NEXWC is interested in environmental technologies and methodologies that are either new, innovative, advance the state of the art, or increase knowledge or understanding of a technology or methodology in one of the following topic areas. (1) **Environmental Assessment, Restoration and Cleanup:** Methodologies to assess and remediate existing pollution generated by military operations. (2) **Conservation of Natural Resources:** Practices that comply with environmental legislation and ensure protection of sensitive resources while supporting military operations. (3) **Unexploded Ordnance (UXO):** Services for detection, location, de-energizing, disposal, or remediation of UXO. (4) **Pollution Prevention.** (5) **Environmental Compliance.** (6) **Sustainability and Climate Change.** Detailed instructions and the form for submitting abstracts can be found at http://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/ec/baa.html.

HAZMAT

Department of Agriculture, Forest Service, R-5 Pacific Southwest Region, Vallejo, CA.
Federal Business Opportunities, FBO-4843, Solicitation AG-91S8-S-15-0012, 2015

The Forest Service Region 5 Office intends to set up Blanket Purchase Order Agreement contracts to secure the professional services of one to four contractors to provide technical services for emergency spill response and non-CERCLA site investigation, cleanup, and restoration (NAICS code 562910). Multiple awards are expected, and the tasks will be full and open competition. The solicitation supporting documents will be posted on FBO.gov on or about March 13, 2015. <https://www.fbo.gov/spq/USDA/FS/91S8/AG-91S8-S-15-0012/listing.html>

AFICA BASE REALIGNMENT AND CLOSURE (BRAC) ENVIRONMENTAL CONSTRUCTION AND SERVICES REQUIREMENTS CONTRACT (BECSRC)

Department of the Air Force, Air Force Installation Contracting Agency (AFICA) - CONUS.
Federal Business Opportunities, FBO-4835, Solicitation FA8903-15-R-0034, 2015

This notice announces a future Air Force requirement to provide a full range of responsive environmental remediation actions necessary to protect human health and the environment. The requirement includes rapid response and removal of contaminated environmental media and site restoration activities located on BRAC bases in EPA Regions 5 through 8, with a 5-year ordering period and 24 additional months for performance completion. Each BECSRC serves as a mechanism for responding to "pop-up" (i.e., small, unplanned, out of cycle) requirements. Release of Solicitation FA8903-15-R-0034 is anticipated in early to mid March 2015. <https://www.fbo.gov/notices/7abc3d6164b5f8d013fb805c3068455c>

ENVIRONMENTAL SUPPORT AND TRAINING SERVICES

Army Contracting Command, MICC Center - Fort Sam Houston (JBSA), TX.
Federal Business Opportunities, FBO-4841, Solicitation W9124J-15-R-0037, 2015

Complex federal environmental regulations have placed an ever-increasing emphasis on environmental compliance and restoration of contaminated sites. On behalf of the 63rd Regional Support Command, information is being gathered to determine the availability of resources to provide Environmental Support and Environmental Training Services for a variety of environmental compliance and remedial management activities for roughly 200 U.S. Army Reserve facilities located in Arkansas, Oklahoma, Texas, New Mexico, Arizona, Nevada, and California. The NAICS code for this acquisition is 541620, with a size standard of \$15M. Responses to this sources sought notice are due by or before COB on March, 23, 2015. <https://www.fbo.gov/notices/72d9ddf07d79e7f8a266bc413485eec0>

SUPPORT THE NATIONAL ENVIRONMENTAL MONITORING CONFERENCE (NEMC) AS PART OF THE ENVIRONMENTAL MEASUREMENT SYMPOSIUM

U.S. EPA Funding Opportunity EPA-OSA-2015-01, 2015

EPA is seeking applications proposing to support the annual National Environmental Monitoring Conference (NEMC) as part of the Environmental Measurement Symposium. NEMC encompasses all environmental media and all of EPA's monitoring programs, with the exception of criteria pollutants in air. EPA anticipates providing financial support to a technically qualified nonprofit organization to manage the NEMC for a 5-year period. The awardee will be responsible for conference design and management, outreach, location/hotel contract negotiations, and logistics. The closing date for this solicitation is March 31, 2015, 11:59:59 PM ET. <http://epa.gov/ncer/rfa/2015/2015-nemc.html>

Cleanup News

THERMAL REMEDIATION OF KARST LIMESTONE: REDSTONE ARSENAL, ALABAMA

Hodges, B., G.N. Jones, G. Beyke, and C. Crownover.

Ninth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, 19-22 May, Monterey, CA. Battelle Press, Columbus, OH. 10 pp, 2014

Electrical resistance heating (ERH) was used in thermal remediation of two Redstone Arsenal sites. Both feature karst limestone with heavy clay overburden, but differ in the characteristics of the limestone. At RSA-53, the heavy clay is underlain by very hard, uniform limestone with no apparent voids or soil inclusions; whereas at RSA-96, the limestone is riddled with soil-filled and water-filled voids;

voids are also observed in the vadose zone soil. The largest water-filled void in the RSA-96 treatment volume appeared to be about 40 ft by 24 ft, with height varying from 3 to 12 ft. At both sites, remediation included treatment of soil and extended to 40 ft into saturated limestone. RSA-53 required remediation of chlorobenzene at concentrations as high as 204,000 µg/L; RSA-96 required remediation of TCE as high as 990,000 µg/L. The treatments targeted regions where DNAPL was considered very likely, with contaminant concentrations >10% of the water solubility limit. As indicated by groundwater concentration reductions, DNAPL was removed successfully from the target regions. Groundwater in the RSA-96 void had relatively low initial TCE concentrations, which declined further during ERH.
<http://www.thermalrs.com/news/newsView.php?pdf=59>

GROUNDWATER GEOCHEMICAL AND SELECTED VOLATILE ORGANIC COMPOUND DATA, OPERABLE UNIT 1, NAVAL UNDERSEA WARFARE CENTER, DIVISION KEYPORT, WASHINGTON, JULY 2013

Huffman, R.L.
U.S. Geological Survey Data Series 871, 54 pp, 2014

Previous investigations indicate that concentrations of chlorinated VOCs (CVOCs) are substantial in groundwater beneath the 9-acre former landfill at Operable Unit 1. The U.S. Geological Survey has continued to monitor groundwater geochemistry to ensure that conditions remain favorable for contaminant biodegradation. A remedy developed in 1998 for contaminated groundwater at OU 1 included phytoremediation and ongoing natural attenuation processes to remove and control CVOC migration in shallow groundwater. In 1999 the U.S. Navy planted hybrid poplar plantations in two areas on the landfill where contaminant concentrations in groundwater were exceptionally high. To determine remedy effectiveness, USGS has monitored geochemistry and contaminant concentrations in groundwater and surface water, along with tree health and water levels, annually from 2001 through 2013 to evaluate reduction-oxidation (redox) conditions and CVOC biodegradation. This report discusses conclusions drawn from groundwater geochemical and selected CVOC data collected by USGS at OU 1 during July 9-12, 2013, and on July 18, 2013.
<http://pubs.usgs.gov/ds/871/>

Demonstrations / Feasibility Studies

IN SITU OXALIC ACID INJECTION TO ACCELERATE ARSENIC REMEDIATION AT A SUPERFUND SITE IN NEW JERSEY

Wovkulich, K., M. Stute, B.J. Mailloux, A.R. Keimowitz, J. Ross, B. Bostick, J. Sun, and Z.N. Chillrud. Environmental Chemistry, Vol 11 No 5, 525-537, 25 Sep 2014

To evaluate the potential of chemical additions to increase arsenic release in situ and boost treatment efficiency, a forced-gradient pilot study was conducted at the Vineland Chemical Co. in southern New Jersey. During spring/summer 2009, oxalic acid and bromide tracer were injected into a small portion (~50 m²) of the site for 3 months. Groundwater samples indicated that introduction of oxalic acid increased As release, with removal of 2.9 to 3.6 kg As from the sampled wells during the 3-month pilot. A comparison of As concentrations on sediment cores collected before and after treatment and analyzed using X-ray fluorescence spectroscopy suggested reduction in As concentrations of ~36% (median difference) to 48% (mean difference). For more information on the pilot study, see K. Wovkulich's Ph.D. dissertation at <http://academiccommons.columbia.edu/catalog/ac%3A139254>.

PYROLUSITE PROCESS® TO REMOVE ACID MINE DRAINAGE CONTAMINANTS FROM KIMBLE CREEK IN OHIO: A PILOT STUDY

Hiremath, S., K. Lehtoma, M. Nicklow, and G. Willison.
USDA, U.S. Forest Service, Northern Research Station, Research Note NRS-194, 14 pp, 2013

Investigators tested the Pyrolusite Process®, a microbiological water treatment system that employs metal-oxidizing bacteria adsorbed on limestone rocks, at the Kimble Creek abandoned coal mine site. The pilot treatment plant was inoculated with a mixture (five strains) of metal-oxidizing bacteria. Water was examined at regular intervals for pH, concentrations of metals (Fe, Al, Mn, Mg, Zn, Ca), dissolved oxygen, temperature, conductivity, sulfate and chloride contents, acidity, alkalinity, and dissolved solids. The pilot system consistently increased the pH of effluent water to above-neutral levels. The Fe and Al contents, as high as 72 mg/L and 50 mg/L, respectively, were below detectable levels in the effluent water. Scanning electron microscope and DNA analyses of rock samples showed growth and density increases of the introduced bacteria. The sludge contained iron (predominantly Fe⁺³), Al, and small amounts of Zn, Mg, and Mn. Based on the performance of the pilot system, a full-scale system was constructed in 2008 at the Kimble Creek site, and water from all portals was directed through it. Results show the larger plant is functioning as expected in increasing pH and removing pollutants.
http://www.fs.fed.us/nrs/pubs/rn/rn_nrs194.pdf

A COMBINATION OF ACID B EXTRA™ AND BIOCHAR TO REDUCE METAL CONCENTRATIONS IN ACID MINE DRAINAGE

Peltz, C.D., C. Zillich, and K.L. Brown.
Journal American Society of Mining and Reclamation, Vol 3 No 1, 100-116, 2014

The Bureau of Land Management's Abandoned Mine Land Program has built and is operating the Eveline Mine Drainage Treatment Vault near Silverton, Colorado, to investigate innovative passive treatment technologies for acid mine drainage (AMD) in high alpine environments. The polyvinyl chloride piping within the pre-cast concrete vault holds 4 yd³ of treatment media and within its 15 ft by 7 ft footprint has the ability to treat an estimated 30 L/min (8 gpm) of mine drainage. This case study examines the potential of combining Bauxsol™ Acid B Extra™ (an alumina refining by-product) with biochar, pea gravel, and porous concrete to reduce AMD metal concentrations. The objective of the trial was to create a passive treatment system that (1) reduces metal concentrations in effluent waters, (2) reduces operational costs, (3) utilizes waste streams from industry, and (4) operates in cold weather climates with limited space for infrastructure. Results suggest that the combination of Acid B Extra™ and biochar achieved optimal near-term results with >95% removal of Cd, Cu, Fe, Mn, and Zn, and >60% removal of Al, without clogging.
<http://www.asmr.us/Publications/Journal/Vol%203%20Issue%201/Peltz-CO.pdf>

ENHANCED AMENDMENT DELIVERY TO LOW PERMEABILITY ZONES FOR CHLORINATED SOLVENT SOURCE AREA BIOREMEDIATION: ESTCP COST AND PERFORMANCE REPORT

ESTCP Project ER-200913, 75 pp, 2014

The overall goal of this project was to demonstrate and validate the use of shear-thinning delivery fluid for enhanced delivery of bioremediation amendments at a low-permeability site impacted by chlorinated solvent and to develop guidance for its use at other sites. The technology demonstration was performed using a combination of xanthan gum (shear-thinning polymer) and ethyl lactate (carbon substrate) to promote biological reductive dechlorination in a low-level TCE plume at Joint Base Lewis-McChord. A significant portion of the amendment persisted through the end of the 8-month performance monitoring period, with evidence for enhanced persistence in the lower-k zones relative to higher-k zones. The amendment resulted in the complete degradation of TCE throughout the heterogeneous treatment zone, with no evidence of rebound. <https://www.serdp-estcp.org/content/download/32297/315751/file/ER-200913-CP.pdf>

OPTIMIZED ENHANCED BIOREMEDIATION THROUGH 4D GEOPHYSICAL MONITORING AND AUTONOMOUS DATA COLLECTION, PROCESSING AND ANALYSIS: ESTCP COST AND PERFORMANCE REPORT

ESTCP Project ER-200717, 49 pp, 2014

This project demonstrated the use of automated electrical geophysical monitoring as an alternative to existing methods to provide timely, volumetric, and cost-effective information on spatiotemporal behavior of amendments used in enhanced bioremediation. Quantitative measures were formulated in terms of spatial resolution, temporal resolution, and data-processing time/turnaround. Qualitative measures pertained to timely delivery of actionable information to scientists/engineers in the field and the ability of geophysical monitoring to map amendment behavior.
<https://www.serdp-estcp.org/content/download/32317/315961/file/ER-200717-CP.pdf>

Research

IMPACT OF DNAPL CONTACT ON THE STRUCTURE OF SMECTITIC CLAY MATERIALS

Ayral, D., M. Otero, M.N. Goltz, and A.H. Demond.
Chemosphere, Vol 95, 182-187, 2014

Smectitic clays have a flexible structure that can be affected by contact with DNAPL present at hazardous waste sites. Measurements of the basal spacing of air-dry clays contacted with pure chlorinated solvents and chlorinated DNAPL waste showed that the intraparticle spacing is similar to that in air. Basal spacings of water-saturated clays contacted with pure chlorinated solvents are similar to those in contact with water, even after extended equilibration times (300 d). In contrast, contact with chlorinated DNAPL waste reduced the basal spacing of water-saturated sodium smectites in a relatively short time frame, resulting in cracks as large as 1 mm in aperture. Penetration of these wastes into the intraparticle spacing of clay and resultant cracking may contribute to the accumulation of chlorinated compounds in clay layers observed in the field and to the extended remediation times associated with this mass storage.

THE TRANSPORT BEHAVIOUR OF ELEMENTAL MERCURY DNAPL IN SATURATED POROUS MEDIA: ANALYSIS OF FIELD OBSERVATIONS AND TWO-PHASE FLOW MODELLING

Sweijen, T., N. Hartog, A. Marsman, and T.J. Keijzer.
Journal of Contaminant Hydrology, Vol 161, 24-34, 2014

Using a CPT probe mounted with a digital camera, in situ mercury DNAPL depth distribution was obtained at a former chlor-alkali plant down to 9 m bgs. Images revealing the presence of silvery mercury DNAPL droplets helped to quantify its distribution, characteristics, and saturation using an image analysis method. Field observations were compared to results from a one-dimensional two-phase flow model simulation for the same transect. Considering the limitations of this approach, simulations reasonably reflected the variability and range of the mercury DNAPL distribution. The migration of mercury and PCE DNAPL in several typical hydrological scenarios was simulated to explore further the impact of mercury's physical properties in comparison with those of more common DNAPLs. Given that mercury's higher density is the main factor controlling its penetration in saturated porous media, despite its higher resistance to flow due to its higher viscosity, the hazard of spilled mercury DNAPL to cause deep contamination of groundwater systems seems larger than for any other DNAPL.

MODELING THE EFFECTS OF NATURALLY OCCURRING ORGANIC CARBON ON CHLORINATED ETHENE TRANSPORT TO A PUBLIC SUPPLY WELL

Chapelle, F.H., L.J. Kauffman, and M.A. Widdowson.
Ground Water, Vol 52 Supl 1, 76-89, 2014

The vulnerability of public supply wells to chlorinated ethene (CE) contamination depends in part on the availability of naturally occurring organic carbon to consume dissolved oxygen (DO) and initiate reductive dechlorination. A mass-balance model of the Kirkwood-Cohansey aquifer (widely used for public water supply in New Jersey) was built by telescoping a calibrated regional 3-D MODFLOW model to the approximate capture zone of a single public supply well that has a history of CE contamination. In SEAM3D, the local model was used for computation of a mass balance between dissolved organic carbon (DOC), particulate organic carbon (POC), and adsorbed organic carbon electron donors, and DO, CEs, ferric iron, and sulfate electron acceptors. SEAM3D was constrained by varying concentrations of DO and DOC entering the aquifer via recharge, varying the bioavailable fraction of POC in aquifer sediments, and comparing observed and simulated vertical concentration profiles of DO and DOC. This procedure suggests that ~15% of the POC present in aquifer materials is readily bioavailable. Model simulations indicate that transport of PCE and daughter products to the public supply well is highly sensitive to the assumed bioavailable fraction of POC, concentrations of DO entering the aquifer with recharge, and the position of simulated PCE source areas in the flow field. The results are less sensitive to assumed concentrations of DOC in aquifer recharge. The mass balance approach used in this study also indicates that hydrodynamic processes such as advective mixing, dispersion, and sorption account for a significant amount of the natural attenuation observed in this system.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4265263/>

A 12-MONTH FIELD TRIAL TO REMEDIATE AN EXPOSED "TAILINGS BEACH" IN TASMANIA

Ferguson, L. Resources and Environment, Vol 4 No 5, 238-245, 2014

The King River is one of the most polluted rivers in Australia; it has been predicted that acid mine drainage will be produced in the river for several hundred years, with two tonnes of copper and 155 kg of sulfuric acid entering the river system each day. Reversing the damaging effects of dumped tailings on this scale is financially and operationally impossible. This study documents the findings of a 12-month field trial conducted in the King River delta. Treatment consisted of the following applications to contaminated tailings: Area 1, control; Area 2, lime and fertilizer; Area 3, soil; Area 4, sand; and Area 5, Terra B. Each area was seeded using local tree species, with vegetative cover density and type the main criteria of successful remediation. Neither the control nor amendment with lime/fertilizer, soil, or sand supported revegetation. Area 5, however, had a pH of 3.9 before treatment and 7.9 after, and leachable metals declined by an average 88%, with total actual and potential acidity reduced to zero. Every type of planted tree species thrived in the more favorable pH conditions, and grass self-seeded and proliferated after 12 months. <http://article.sapub.org/10.5923.j.re.20140405.05.html>

DEPLOYMENT OF AIDED PHYTOSTABILISATION AT FIELD SCALE: SET UP AND MONITORING LESSONS

Bert, V., A. Buffard, A. Cherifi-Alaoui, A. Hoste, N. Manier, M. Mench, and P. Boucard.
CABERNET 2014: Tailored & Sustainable Redevelopment toward Zero Brownfields, 4th International Conference on Managing Urban Land, 14-16 October 2014, Frankfurt am Main, Germany. 27 slides, 2014

Aided phytostabilization was implemented in September 2011 at a site located in the Nord-Pas-de-Calais region (France) by combining plants and a soil amendment to reduce the risks of heavy metals, mainly Zn and Cd. The 1-ha site is part of a large sediment disposal area affected by industrial activities. The objective was to combine aided phytostabilization with bioenergy production based on *Salix* cultivation to (1) reduce the environmental risk posed by the sediments and (2) allow economic valorization of the sediments via the sale of the produced biomass. Initially, *Deschampsia cespitosa*, a grass, and Thomas basic slag (TBS), a basic mineral amendment, were used to stabilize metals in the top layer of sediment. In a second step, two *Salix* cultivars (Inger and Tordis) were deployed to produce biomass. TBS is expected to inhibit metal shoot transfer into the plants and decrease the labile metal pool. The plant cover rapidly reached 100%, although phytotoxicity signs appeared after a few months. The grass showed very little Zn and Cd concentrations in aerial parts, but the two willow cultivars had very high Cd and Zn leaf concentrations. The metal concentrations in leaves and wood at harvest may direct the conversion process of the produced biomass (i.e., thermal treatment, metal recovery).

http://www.zerobrownfields.eu/HombreTrainingGallery/05_PHYTOSED_Bert.pdf

EFFECTIVE TREATMENT OPTIONS FOR ACID MINE DRAINAGE IN THE COAL REGION OF WEST VIRGINIA

Kirby, Daniel, Master's thesis, Marshall University, 47 pp, 2014

In an assessment of the relative effectiveness of the acid mine drainage treatment systems currently operating in the state of West Virginia, data for each treatment site included type of treatment, cost, load reduction of acidity, and metal load reduction. The data were used in GIS and statistical operations to show where AMD is a problem and the effectiveness, both overall and by cost, of the implemented treatment. Anoxic limestone drains, open limestone channels, and land reconstruction appear to function most effectively for reduction of acidity and metals in comparison to the other treatment types in use.

<http://mds.marshall.edu/cgi/viewcontent.cgi?article=1862&context=etd>

TECHNOLOGY TRAIN FOR REUSING EXCAVATED MATERIAL IN A BROWNFIELD REGENERATION CONTEXT

Baclocchi, R., O. Capobianco, G. Costa, R. Gavasci, and F. Lombardi. CABERNET 2014: Tailored & Sustainable Redevelopment toward Zero Brownfields, 4th International Conference on Managing Urban Land, 14-16 October 2014, Frankfurt am Main, Germany. 20 slides, 2014

After researchers determined the appropriate type and amount of binder, they applied a combined solidification/stabilization and granulation treatment to a contaminated brownfield soil. While the resulting product presented sufficient mechanical strength for construction applications, the treatment led to an increased release of certain metals, especially Cu; nevertheless, the obtained leaching concentrations complied with the limits established by Italian regulations for groundwater quality. Results suggest that the proposed combined process might be a viable treatment for recycling the excavated soil produced during the future regeneration phase of the Terni brownfield site http://www.zerobrownfields.eu/HombreTrainingGallery/06_Baclocchi.pdf

TESTING NOVEL COMBINATIONS OF AMENDMENTS FOR STABILIZATION OF METALS IN HEAVILY CONTAMINATED SOILS

Siebielec, G., P. Kidd, M. Mench, M. Pecio, R. Galazka, V. Alvarez-Lopez, J. Vangronsveld, W. Friesl-Hanl, M. Puschenreiter, and A. Cundy. CABERNET 2014: Tailored & Sustainable Redevelopment toward Zero Brownfields, 4th International Conference on Managing Urban Land, 14-16 October 2014, Frankfurt am Main, Germany. 42 slides, 2014

Researchers compared the impact of novel soil amendment combinations and traditional materials on metal solubility and response of plants, soil organisms, and microbial activity. One-year greenhouse pot experiments were established in soil A (a less toxic soil affected by long-term Zn/Pb smelter emissions, pH 7.0), and soil B (toxic soil from a smelter dust spill, pH 6.8). Amendments were tested individually and in combination in planted and unplanted soils: compost, drinking water residue, iron grit, Ca-phosphate, LD slag, Thomas basic slag, gravel sludge, siderite, Fe nanosorbent, and cyclonic ash. Soil B was planted with grasses and soil A with lettuce. Plants were periodically harvested, yields recorded, and metal content determined. Soil metal extractability and bioaccessibility, pH, EC, and soil pore water content were measured in parallel with tests that evaluated earthworm behavior and metal accumulation. This presentation describes the results. http://www.zerobrownfields.eu/HombreTrainingGallery/08_siebielec.pdf

PRACTICAL REMEDIATION OF THE PCB-CONTAMINATED SOILS

Ido, A., M. Niikawa, S. Ishihara, Y. Sawama, T. Nakanishi, Y. Monguchi, H. Sajiki, and H. Nagase. Journal of Environmental Health Science and Engineering, Vol 13, 9, 2015

A practical method for the elimination of PCBs from PCB-contaminated soil combines chemical degradation with Soxhlet extraction, using a newly developed modified Soxhlet extractor that possesses an outlet valve on the extraction chamber. Different types of PCB-contaminated soils were completely extracted in refluxing hexane, and subsequent hydrodechlorination was completed within 1 h in a hexane-methanol (1:5) solution in the presence of Pd/C and triethylamine under ordinary hydrogen pressure and temperature in a complete one-pot procedure. The system is a simple, safe, mild, and reliable method to cleanse PCB-contaminated soil. Soxhlet extraction of PCBs with hexane from quartz sand was complete in a 2-h period, with similar results in silica sand, diatomaceous earth, and two horticultural soils (Akadama-tsuchi and Kanuma-tsuchi). Extraction of PCB-contaminated bentonite was incomplete within 2 h, probably because bentonite strongly adsorbed PCBs, but proved successful when extraction time was extended to 4 h. <http://www.ijehse.com/content/13/1/9>

LEAD IMMOBILIZATION AND PHOSPHORUS AVAILABILITY IN PHOSPHATE-AMENDED, MINE-CONTAMINATED SOILS

Osborne, L.R., L.L. Baker, and D.G. Strawn. Journal of Environmental Quality, Vol 44 No 1, 183-90, 2015

Application of phosphorus to promote the formation of low-solubility lead phosphate minerals is a recognized in situ treatment approach for remediating Pb-contaminated soils; however, this strategy can result in excess P runoff to surface waters, which can lead to eutrophication, particularly when used in riparian areas. Experiments in which monopotassium phosphate (KH₂PO₄) solution was applied to two Pb-contaminated soils from the Coeur d'Alene River valley showed that higher phosphate amendment decreased Pb extractability, although amendment rates above ~70 mg kg did not provide any additional Pb immobilization. P availability increased with increasing phosphate application rate. This paper presents an empirical relationship that predicts extractable Pb as a function of extractable P, which allows for prediction of the amount of Pb that can be immobilized at specified P leaching amounts, such as regulatory levels that have been established to minimize risks for surface water degradation.

GUIDELINES FOR PRELIMINARY DESIGN OF FUNNEL-AND-GATE REACTIVE BARRIERS

Courcelles, B. International Journal of Environmental Pollution and Remediation, Vol 3, 16-26, 2015

Three geometric configurations of permeable reactive barriers (PRBs) are encountered in the literature: a continuous wall, a funnel-and-gate system, and a caisson configuration. This paper is focused on the design of the second and third geometric configurations and presents an analytical solution of the flow in a PRB based on the Schwarz-Christoffel transformation. This analytical solution is coupled to residence time calculations to define a design methodology, taking into account the parameters of cut-off width, slenderness of the reactive cell, and hydraulic conductivity. A guidance diagram for the design of funnel-and-gate or caisson configurations is provided, as well as a case study. <http://ijep.aveestia.com/2015/003.html>

NATURAL ATTENUATION OF PERCHLORATE IN DENITRIFIED GROUNDWATER

Robertson, W.D., J.W. Roy, S.J. Brown, D.R. Van Stempvoort, and G. Bickerton. Groundwater, Vol 52 No 1, 63-70, 2014

Monitoring of a well-defined septic system groundwater plume and groundwater discharging to two urban streams located in southern Ontario, Canada, provided evidence of natural attenuation of background low-level (ng/L) perchlorate under denitrifying conditions in the field. The septic system site at Long Point contains perchlorate from a mix of wastewater, atmospheric deposition, and periodic use of fireworks, while the nitrate plume indicates active denitrification. Plume nitrate concentrations of up to 103 mg/L declined downgradient and with depth due to denitrification and anammox activity, and the plume was almost completely denitrified beyond 35 m from the tile bed. Perchlorate natural attenuation occurs at the site only when nitrate concentrations are

INTEGRATED PHYTOBIAL REMEDIATION FOR SUSTAINABLE MANAGEMENT OF ARSENIC IN SOIL AND WATER

Roy, M., A.K. Giri, S. Dutta, and P. Mukherjee. Environment International, Vol 75, 180-198, 2015

This review focuses on how phytoremediation and bioremediation implemented together can provide integrated phytobial remediation for synergistic, large-scale removal of As from soil, sediment, and groundwater. Introduction of transgenic plants and microbes has the potential to deliver more efficient treatment of As. The paper identifies a critical research gap in remediation of As-contaminated groundwater used for drinking and irrigation and stresses that more research should be conducted on As removal in constructed wetlands, one of the most effective applications of phytobial remediation. The review also considers different phytobial investigation and phytodisposal methods relevant to full-scale implementation.

General News

COMBINING REMEDIES FOR MORE EFFECTIVE SITE CLEANUP

U.S. EPA, Technology Innovation and Field Services Division, CLU-IN website, 2015

This new CLU-IN Web page offers 28 case studies of multiple technologies used together or in treatment trains to develop remedial approaches that address contamination resulting from release to the subsurface of NAPLs and other chemical species.
<http://clu-in.org/products/combinedremedies/>

BOOK OF ABSTRACTS: INTERNATIONAL CONGRESS OF PHYTOREMEDIATION OF POLLUTED SOILS, JULY 29-30, 2014, VIGO, SPAIN

Arenas Lago, D., F. Alonso Vega, and A. Rodriguez Seijo (eds). Universidade de Vigo, Spain. ISBN: 978-84-697-0747-0, 120 pp, 2014

Session 1 of this conference focused on heavy metals, Session 2 on organic pollutants, Session 3 on radioactive elements, and Session 4 on other aspects of phytoremediation. <http://webs.uvigo.es/phytozem.congress/Abstracts%20book%20-%20PPS%202014.pdf>

ECONOMIC IMPACTS OF OREGON'S BROWNFIELDS PROGRAMS

Juntunen, L., E. Picha, and C. Jensen.

Oregon Business Development Department, 17 pp, 2014

This 2014 study estimates there are 13,500 brownfield sites in Oregon with known or suspected contamination. Some of the sites are abandoned by their owners; others are simply mothballed. Based on analysis of almost 100 completed brownfield cleanups in Oregon paid for with state money, this study concludes that the overall economic benefits of the rehabilitations significantly outweigh their cost. The executive summary is posted alongside appendices A-D at <http://www.orinfrastructure.org/Infrastructure-Programs/Brownfields/>.

The Technology Innovation News Survey welcomes your comments and suggestions, as well as information about errors for correction. Please contact Michael Adam of the U.S. EPA Office of Superfund Remediation and Technology Innovation at adam.michael@epa.gov or (703) 603-9915 with any comments, suggestions, or corrections.

Mention of non-EPA documents, presentations, or papers does not constitute a U.S. EPA endorsement of their contents, only an acknowledgment that they exist and may be relevant to the Technology Innovation News Survey audience.