Technology Innovation News Survey

Entries for March 16-31, 2016

Market/Commercialization Information

SOIL INVESTIGATION
Department of the Air Force, Air Education and Training Command, Luke AFB, Arizona.
Federal Business Opportunities, FBO-5263, Solicitation FA4887-16-Q-0004, 2016

This announcement constitutes a solicitation for Purchase Request F2U3066070AW01. The 56th Contracting Squadron, Luke AFB, Arizona, intends to award a firm-fixed-priced contract as a small business set-aside. The contractor shall provide all manpower, equipment, and materials necessary to prepare plans/reports in support of a site characterization effort that includes soil borings and associated sampling and analytical work to characterize any possible contamination adjacent to the west side of Hangar 913 at Luke AFB, where disposal of a wastewater mixture of jet fuel is suspected. Both the horizontal and vertical extent of the potential contamination must be defined. The entire period of performance is not to exceed 12 months from contract award date. The NAICS code is 541620, Environmental Consulting Services, with a size standard of $15M. Proposals are due by 2:00 PM MT on May 19, 2016.
https://www.fbo.gov/spg/USAF/AETC/LukeAFBCS/FA4887-16-Q-0004/listing.html

ENVIRONMENTAL REMEDIATION SERVICES: FORMER KANSAS ARMY AMMUNITION PLANT, 1200 AREA
U.S. Army Corps of Engineers, USACE District, Kansas City, Missouri.
Federal Business Opportunities, FBO-5266, Solicitation MATOCS-16-R-HX23, 2016

The USACE Northwestern Division, Kansas City District, is conducting market research on sources able to provide performance-based environmental remediation services at the Former Kansas Army Ammunition Plant 1200 Area site. Work for the future procurement falls under the Base Realignment and Closure Program. Small businesses in all socioeconomic categories are encouraged to identify their capabilities in meeting the requirement at a fair market price. If a set-aside solicitation results from this notice, it likely will be for an IDIQ contract not to exceed $10M. The contractor's place of business must be within one of the listed counties (Kansas Counties: Cherokee, Crawford, Montgomery, Neosho, Wilson, and Labette; Oklahoma Counties: Craig and Nowata). The anticipated NAICS code is 562910, Environmental Remediation Services, with a size standard of 750 employees. Capabilities packages are due by 1:00 PM CT on May 13, 2016.
https://www.fbo.gov/spg/USA/COE/DACA41/MATOCS-16-R-HX23/listing.html

NWD MEGA PHASE B 8(A) AE SERVICES MATOC
U.S. Army Corps of Engineers, USACE District, Kansas City, Missouri.
Federal Business Opportunities, FBO-5262, Solicitation W912DQ-16-R-3003, 2016

The Northwestern Division (NWD) of the U.S. Army Corps of Engineers is requesting SF330s from 8(a) small business firms capable of performing the services required for Architect-Engineer Hazardous, Toxic, and Radioactive Waste environmental indefinite delivery contracts as part of NWD's Phase B of the Multiple Environmental Government Acquisition. The majority of the work will be located in the Kansas City, Omaha, and Seattle districts. Contractors 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. The Government intends to award contracts to three 8(a) small business firms that will share $6 million in total contract capacity. Each contract will include a base period of three years and one 2-year option. The NAICS code for this procurement is 541330, Engineering Services, with a size standard of $15M. Submittals must be received by 1:00 PM CT on May 20, 2016. https://www.fbo.gov/spg/USA/COE/DACA41/W912DQ-16-R-3003/listing.html

ENVIRONMENTAL REMEDIATION AND DECOMMISSIONING SERVICES
Department of Transportation, Volpe National Transportation Systems Center, Cambridge, Mass.
Federal Business Opportunities, FBO-5273, Solicitation DTRT57-16-SS-00004, 2016

The Government is conducting market research to determine the acquisition strategy for environmental services at the John A. Volpe National Transportation Systems Center, Cambridge, Mass., specifically to evaluate the availability of potential offerors that (1) are classified as small business under NAICS code 562910, (2) possess technical capability and experience in cleanup and closure of contaminated sites, the dismantling and demolition of obsolete and abandoned infrastructure, and reconstruction of infrastructure; and (3) have the fiscal and staffing capacity for working on multiple complex projects simultaneously across large geographic areas. Support is needed in multiple task areas, including but not limited to containment, removal, treatment (on-site, off-site, and in situ), sampling and analysis for monitoring and control, transportation and disposal, operation and maintenance, hazardous materials abatement, demolition, site restoration, and other actions that support site cleanup, decommissioning, and closure. Submit capability statements via email by 5:00 PM ET on May 23, 2016.https://www.fbo.gov/notices/bcbe6ecdbefad053f8e7a50a11517aa5

AFICA ENVIRONMENTAL SERVICES & CONSTRUCTION (ESC-PACAF)
Department of the Air Force, AFICA - CONUS, San Antonio, Texas.
Federal Business Opportunities, FBO-5272, Solicitation FA8903-16-R-0006, 2016

Requirements under this contract will primarily support environmental restoration/remediation and operations/services efforts to address environmental needs at Pacific Air Force (PACAF) installations and other locations. This requirement is 100% set aside for small businesses for as many as five awards with a total ceiling of $48M, NAICS code 562910 (750 employees or fewer). Contract terms include a five-year ordering period plus three additional years for performance completion. The contracts are contemplated to be IDIQ with firm-fixed-price and cost-plus-fixed-fee pricing arrangements. Responses to the final RFP are due by 12:00 PM CT on May 24, 2016.
https://www.fbo.gov/notices/b0e38a4f9646a9a5799d8088cdc353c8

PADUCAH DEACTIVATION & REMEDIATION
U.S. Department of Energy, EMCBC, Office of Contracting, Cincinnati, OH.
Federal Business Opportunities, FBO-5272, Solicitation DE-SOL-0008746, 2016

DOE's Environmental Management Consolidated Business Center has released a DRAFT RFP to allow potential offerors to review it and submit questions and comments prior to issuance of the official solicitation for the future Paducah Deactivation & Remediation contract. Information files are posted on FedConnect at https://www.fedconnect.net/FedConnect/?doc=DE-SOL-0008746&agency=DOE [Note: It might be necessary to copy and paste the URL into your browser for direct access.]. Submit questions or comments on the DRAFT RFP by May 26, 2016, via email to PaducahDR@emcbc.doe.gov.

Cleanup News

PACIFIC COAST PIPELINE, FILLMORE, CALIFORNIA
U.S. EPA Region 9 Website, 2015

The site contractor began operation of a new groundwater remediation system in June 2015 for the Pacific Coast Pipeline Superfund site. An air sparging and soil vapor extraction (SVE) system was installed to inject air into the groundwater and extract soil vapors. Oxygen in the injected air helps naturally occurring bacteria break down the VOCs, and the air bubbles moving through the subsurface pick up VOCs for subsequent extraction. The new system is expected to operate for 3 to 5 years. Current site conditions enable the cleanup plan to be expedited; owing to drought conditions, groundwater currently is >75 ft bgs, and the cleanup target zone is dry. This circumstance provides an opportunity to speed up the cleanup by increasing SVE from the dry zone before expected winter rains raise the groundwater level. Additional temporary extraction and treatment equipment enclosed inside a truck on the property will operate 24 hours a day, 7 days a week, for about 4 months, beginning in October 2015.

EPA FINALIZES $9 MILLION INTERIM CLEANUP PLAN FOR EXPANDED AREA AT CTS OF ASHEVILLE INC. SUPERFUND SITE
U.S. Environmental Protection Agency News Release, 11 Feb 2016

U.S. EPA has selected an interim cleanup plan to address contamination beneath the former plant at the CTS of Asheville Inc. Superfund Site. The $9 million cleanup is expected to address the source of the TCE that is leeching from the CTS site on Mills Gap Road. Under the final cleanup plan specified in EPA's record of decision, 3.1 acres will be treated to address TCE NAPL in the groundwater beneath the site. About 208,250 yd^3 of material in the saturated zone between the observed water table and top of competent bedrock will be cleaned up using a combination of electrical resistance heating (ERH) and in situ chemical oxidation (ISCO). ERH will be used to treat the mixed NAPL and TCE plume in an area of ~1.2 acres in addition to ~47,250 yd^3 of NAPL/TCE saturated material. ISCO will be used on TCE-only contamination comprising a volume of ~161,000 yd^3 in a 1.9-acre treatment area. The technologies are expected to reduce TCE concentrations in the treated areas by 95%, and performance data will be collected to demonstrate the effectiveness in meeting this objective. EPA anticipates that design and implementation of the interim remedy will begin later in 2016. This interim remedy will be followed in several years by a final site-wide cleanup decision. *More information about the CTS site:* http://www.epa.gov/region4/superfund/sites/npl/northcarolina/millsgapnc.html.

Demonstrations / Feasibility Studies

AN INNOVATIVE BIOREMEDIATION STRATEGY FOR TREATING CHLORINATED VOCS IN LOW-PERMEABILITY SATURATED SOILS USING SPECIALIZED JETTING TECHNIQUES
Elkins, B., M.-C. Yeh, E. Alperin, and S. Uesawa.
RemTEC Summit, 1-4 March 2015, Westminster, CO. 20 slides, 2015

International collaborators combined a specialized construction technique with a specially engineered EOS® substrate to promote in situ bioremediation in low permeability soils affected by PCE, TCE, and daughter products at a demonstration site located in Japan. The objectives were to 1) increase immediate treatment contact with contaminants, and 2) decrease the distance required for hydrogen gas generated by fermentation to diffuse through the saturated soil and stimulate reductive dechlorination. In October 2011, two highly contaminated test locations at a Tokyo dry cleaning facility were chosen for injection. Initial soil leachate concentrations of PCE and TCE ranged from 24 mg/L and 2.7 mg/L, respectively. The substrate was injected in two of the three test locations using a specialized jetting process. Monitoring results over two years indicated that the jetting technique had delivered the EOS® substrate into low permeability zones effectively and achieved enhanced reductive dechlorination of target CVOCs. Two years after injection, CVOC concentrations were as much as 99% and 95% lower in some groundwater and soil leachate samples, respectively. Bioremediation of soil leachate is a relatively slow process, however, and more time will be required to meet some of the soil cleanup criteria.
Slides: http://www.remtecsummit.com/images/presentations/Brad%20Elkins.pdf
Longer abstract: http://www.remtecsummit.com/index.php/12-speaker-bios/584-brad-elkins-new-bio.

DEVELOPMENT OF A WILLOW-BASED EVAPOTRANSPIRATION COVER SYSTEM
Ung, C.D., C.C. Calkins, T.A. Volk, M.S. Markert, A.S. Eallonardo Jr., K.K. Kolwaite, et al.
Global Waste Management Symposium 2016, Indian Wells, CA. 7 pp + 27 slides, 2016

The Solvay Settling Basins 9-15, a New York State Class 3 inactive hazardous waste disposal site, is a complex of former tailings ponds comprising ~600 acres near Onondaga Lake, Syracuse. The tailings are a byproduct of local soda ash industry. Since the last deposition ~30 years ago, the tailings have dewatered to an alkaline, infertile material that comprises the main rooting substrate on site. A phased research, development, and commercialization program began in 2003 to minimize leachate generation via an evapotranspiration (ET) cover system for the site. Implemented over ~125 acres, the cover system, based on fast-growing willow vegetation, also is designed to produce renewable energy via woody biomass. With the proper combination of organic amendments and site preparation, willow production on this site has reached and sometimes exceeded levels measured on agricultural soils in the region. Growing season ET crop coefficients ranged up to 3 and averaged 1.1, suggesting substantial enhancement of background ET rates and reductions in leachate generation. A program of monitoring, improving site preparation and pest management, and screening new willow varieties is ongoing to ensure long-term system performance. **Willow website:** http://www.esf.edu/willow/.
Paper: http://eventservices.pentop.com/events/2016/gwms/content/abstracts/Individual_Presentations/Ung_Cambria_presenting_co-author_Development_of_a_Willow-based_Evapotranspiration_Cover_System.pdf
Slides: http://www.phg.com/uploads/insights/GWMS-WillowETCoverSystem-Ung.pdf.

Research

A FIELD INVESTIGATION ON TRANSPORT OF CARBON-SUPPORTED NANOSCALE ZERO-VALENT IRON (NZVI) IN GROUNDWATER
Busch, J., T. Meisner, A. Potthoff, S. Bleyl, A. Georgi, K. Mackenzie, R. Trabitzsch, et al.
Journal of Contaminant Hydrology, Vol 181, 59-68, 2015

Although fast agglomeration and sedimentation of NZVI in colloidal suspensions has affected its widespread deployment, colloid-supported NZVI shows promising characteristics to overcome the limitation. Mobility of carbo-iron colloids (CIC)—a newly developed composite material based on finely ground activated carbon as an NZVI carrier—was tested in a field application in which a horizontal dipole flow field was established between two wells separated by 5.3 m in a confined natural aquifer. The injection/extraction rate was 500 L/h. About 1.2 kg of CIC suspended with the polyanionic stabilizer carboxymethyl cellulose was introduced into the aquifer at the injection well. Breakthrough of CIC was observed visually and based on total particle and iron concentrations detected in samples from the extraction well. Filtration of water samples revealed a particle breakthrough of about 12% of the amount introduced, thus demonstrating the high mobility of CIC particles and indicating the potential for NZVI carried on CIC to be used for contaminant plume remediation by in situ formation of reactive barriers. *See chapter 4 in J. Busch's dissertation at* https://publishup.uni-potsdam.de/frontdoor/index/index/docId/7687.

MERCURY REMEDIATION IN WETLAND SEDIMENT USING ZERO-VALENT IRON AND GRANULAR ACTIVATED CARBON
Lewis, A.S., T.G. Huntington, M.C. Marvin-DiPasquale, and A. Amirbahman.
Environmental Pollution, Vol 212, 366-373, 2016

Field mesocosms were installed in a wetland fringing Hodgdon Pond (Maine), and zero-valent iron (ZVI) or granular activated carbon (GAC) was applied to wetland sediment to investigate the potential for reducing methylmercury (MeHg) production and bioavailability to benthic organisms. Pore-water MeHg concentrations were lower in treated compared with untreated mesocosms, but sediment MeHg and total Hg (THg) concentrations were not significantly different between treated and untreated mesocosms, suggesting that smaller pore-water MeHg concentrations in treated sediment likely were due to adsorption to ZVI and GAC rather than to inhibition of MeHg production. In lab experiments with intact vegetated sediment clumps, amendments did not significantly change sediment THg and MeHg concentrations; however, the mean pore-water MeHg and MeHg:THg ratios were lower in the amended sediment than in the control. In the lab, snails accumulated less MeHg in sediment treated with ZVI or GAC. Results suggest that both GAC and ZVI have potential for reducing MeHg bioaccumulation in wetland sediment. *See additional information in a USGS report at* http://pubs.usgs.gov/sir/2014/5234/.

A FRACTURED ROCK GEOPHYSICAL TOOLBOX METHOD SELECTION TOOL
Day-Lewis, F.D., C.D. Johnson, L.D. Slater, J.L. Robinson, J.H. Williams, C.L. Boyden, et al.
Groundwater [Technology Spotlight], 2016

Geophysical technologies have the potential to improve site characterization and monitoring in fractured rock, but the appropriate and effective application of geophysics at a particular site strongly depends on project goals (e.g., identifying discrete fractures) and site characteristics (e.g., lithology). No method works at every site or for every goal. This paper presents a new approach, the Excel-based Fractured-Rock Geophysical Toolbox Method Selection Tool (FRGT-MST). FRGT-MST was developed to equip remediation professionals with a tool to evaluate what is likely to be realistic and cost-effective when contracting geophysical services, and to reduce the application of geophysics with unrealistic objectives or where the methods are likely to fail. *See the manuscript version of this paper at* http://water.usgs.gov/ogw/bgas/frgt/.

ANALYTICAL CHARACTERISATION OF NANOSCALE ZERO-VALENT IRON: A METHODOLOGICAL REVIEW
Chekli, L., B. Bayatsarmadi, R. Sekine, B. Sarkar, A.M. Shen, K.G. Scheckel, W. Skinner, et al.
Analytical Chimica Acta, Vol 903, 13-35, 2016

Many analytical techniques are now available to determine the particle size, surface chemistry, and bulk composition of nanoscale zero-valent iron (NZVI) particles, and this paper provides a critical review of their usefulness and limitations for NZVI characterization. The methods include microscopy and light scattering techniques for the determination of particle size, size distribution and aggregation state, and X-ray techniques for the characterization of surface chemistry and bulk composition. Example characterization data derived from commercial NZVI materials further illustrates method strengths and limitations. Challenges with respect to NZVI characterization in groundwater samples are also covered.

USE OF VARIOUS ZERO VALENT IRONS FOR DEGRADATION OF CHLORINATED ETHENES AND ETHANES
Waclawek, S., J. Nosek, L. Cadrova, V. Antos, and M. Cernik.
Ecological Chemistry and Engineering S, Vol 22 No 4, 577-587, 2015

Researchers compared the effectiveness of nanoscale and microscale zero-valent iron (ZVI) from different sources and the influence of electrokinetics (EK) in dehalogenation of chlorinated ethenes and ethanes. Chlorinated compound concentrations, pH, oxidation-reduction potential, and conductivity were determined in six slurries, each containing ZVI from a different source, during the long-term kinetic test. Kinetic rate constants calculated for the degradation of PCE, TCE, and cis-DCE indicated that the EK technique contributed substantially to chlorinated compounds degradation. Nanoscale ZVI STAR had the highest reaction rates compare to the other ZVI sources tested. This type of study might serve as a useful preliminary assessment of the various available ZVI sources prior to in situ application. *This paper is* ***Open Access*** *at* http://www.degruyter.com/view/j/eces.2015.22.issue-4/eces-2015-0034/eces-2015-0034.xml

AQUIFER MODIFICATION: AN APPROACH TO IMPROVE THE MOBILITY OF NANOSCALE ZERO-VALENT IRON PARTICLES USED FOR IN SITU GROUNDWATER REMEDIATION
Micic-Batka, V., D. Schmid, F. Marko, M. Velimirovic, S. Wagner, F. von der Kammer, & T. Hofmann.
Geophysical Research Abstracts, Vol 17, EGU2015-13487, 2015

The effect of different polyelectrolytes on nanoscale zero-valent iron (NZVI) mobility was tested in natural sands sampled from brownfield sites. Changes in the sand's surface charges were examined after addition of the proposed aquifer modifiers, lignin sulfonate and humic acid. The surface charge of sand in low ionic strength background solution was more negative than sand in high ionic strength background solution. An increase in sand negative surface potential was recorded when aquifer modifiers were applied in a background solution with low ionic strength, indicating their potential to improve NZVI mobility under comparable environmental conditions; however, no significant change of sand surface potential was observed when aquifer modifiers were applied in a background solution with high ionic strength. The potential of the aquifer modifiers to promote the mobility of NZVI was further tested in flow-through columns, starting with one filled with rough-surfaced natural quartz sand, low ionic strength background solutions, and pre-injected lignin sulfonate at 50 mg/L concentration. Preliminary results showed that pre-injection of lignin sulfonate increased NZVI mobility under this experimental condition. *See more on assessment of lignin sulfonate and humic acid for aquifer modification in F. Marko's thesis at* http://othes.univie.ac.at/39147/1/2015-10-08_0713645.pdf

SYNTHESIS AND CHARACTERIZATION OF GREEN AGENTS COATED PD/FE BIMETALLIC NANOPARTICLES
Wang, X., L. Le, P.J.J. Alvarez, F. Li, and K. Liu.
Journal of the Taiwan Institute of Chemical Engineers, Vol 50, 297-305, 2015

Three green agents—polyethylene glycol (PEG), starch, and guar gum—were coated on Pd/Fe bimetallic nanoparticles (NPs) to enhance the stability and reactivity of Pd/Fe NPs. Compared with the pristine unmodified Pd/Fe NPs, decreases in aggregations of modified Pd/Fe NPs were observed. 2,4-Dichlorophenol (2,4-DCP) dechlorination experiments show that physico-chemical properties of the three modifiers have different effects on the reactivity of modified Pd/Fe NPs. The initial pH value of the reaction system had complex effects on 2,4-DCP dechlorination when using the modified Pd/Fe NPs. Activation energies of pristine, PEG-Pd/Fe, starch-Pd/Fe, and guar gum-Pd/Fe NPs were calculated to be 39.47 kJ/mol, 38.66 kJ/mol, 36.59 kJ/mol, and 33.88 kJ/mol, respectively, suggesting that the modification process can enhance the dechlorination rate of Pd/Fe NPs and that catalytic hydrodechlorination process of 2,4-DCP with modified Pd/Fe NPs is a surface-controlled chemical reaction. http://alvarez.rice.edu/files/2015/07/20d-16ercl9.pdf

IMPACT OF NANOSCALE ZERO VALENT IRON ON BACTERIA IS GROWTH PHASE DEPENDENT
Chaithawiwat, K., A. Vangnai, J.M. McEvoy, B. Pruess, S. Krajangpan, and E. Khan.
Chemosphere, Vol 144, 352-359, 2016

The toxic effects of nanoscale zero-valent iron (NZVI) particles on bacteria in different phases of growth were studied using four bacterial strains: *Escherichia coli* strains JM109 and BW25113, and *Pseudomonas putida* strains KT2440 and F1. Cell viability was determined by the plate count method. All four bacterial strains in lag and stationary phases showed higher resistance to NZVI, whereas cells in exponential and decline phases were less resistant and rapidly inactivated upon exposure. Bacterial inactivation increased with NZVI concentration. When bacterial cells were exposed to the filtrate of NZVI suspension, https://www.ndsu.edu/vetandmicro/images/uploads/miscellaneous_files/Chaitawiwat_2016.pdf

LOW-CONCENTRATION TAILING AND SUBSEQUENT QUICKLIME-ENHANCED REMEDIATION OF VOLATILE CHLORINATED HYDROCARBON-CONTAMINATED SOILS BY MECHANICAL SOIL AERATION
Ma, Y., X. Du, Y. Shi, Z. Xu, J. Fang, Z. Li, and F. Li.
Chemosphere, Vol 121, 117-123, 2015

The removal efficiency of VOCs from soil reportedly is relatively low in the late stages of remediation via mechanical soil aeration owing to tailing. Tailing may extend the remediation time required and typically results in the presence of contaminant residues at levels exceeding cleanup goals. Researchers investigated the tailing that occurs during remediation of soils contaminated with volatile chlorinated hydrocarbons (VCHs) and also assessed possible quicklime-enhanced removal mechanisms. Results showed that temperature and aeration rate can be important controls on both the timing of tailing occurrence and the levels of residual contaminants. Furthermore, the addition of quicklime to soil during tailing can reduce the residual concentrations rapidly below the remedial target values required for site remediation. Quicklime addition can improve VCHs volatilization by increasing soil temperature, reducing soil moisture, and enhancing soil permeability.

ARSENIC BIOAVAILABILITY IN SOILS BEFORE AND AFTER SOIL WASHING: THE USE OF *ESCHERICHIA COLI* WHOLE-CELL BIOREPORTERS
Yoon, Y., Y. Kang, Y. Chae, S. Kim, Y. Lee, S.-W. Jeong, and Y.-J. An.
Environmental Science and Pollution Research, Vol 23 No 3, 2353-2361, 2016

Quantification of bioavailable As in contaminated soils and evaluation of the effect of soil-washing processes on As bioavailability was investigated using a novel bacterial bioreporter. The whole-cell bioreporter was genetically engineered by fusing the promoter of nik operon from *Escherichia coli* and green fluorescent protein as a sensing domain and reporter domain. Among eight hazardous heavy metals, the bioreporter responded specifically to arsenic with a response that was proportional to As(III) concentration. Results suggest that As bioavailability in soils is related to soil properties and the duration of aging, although the soluble As is not all bioavailable, and most of bioavailable As in soils is water nonextractable. Bioavailable As increased after soil washing while As total amount decreased, thereby suggesting that washing processes can release As to be bioavailable, which underscores the value of a tool for rapid assessment of As bioavailability.

ORGANIC AMENDMENTS FOR RISK MITIGATION OF ORGANOCHLORINE PESTICIDE RESIDUES IN OLD ORCHARD SOILS
Centofantia, T., L.L. McConnell, R.L. Chaney, W.N. Beyer, and N.A. Andradea, et al.
Environmental Pollution, Vol 210, 182-191, 2015

The effect of compost and biochar amendments on aged DDT, DDE, and dieldrin residues was examined in an old orchard soil. The change in bioavailability of pesticide residues to *Lumbricus terrestris* L. relative to the unamended control soil was assessed using 4-L soil microcosms with and without plant cover in a 48-day experiment. The use of aged dairy manure compost and biosolids compost was found to be effective, especially in the planted treatments, at lowering the bioavailability factor (BAF) by 18-39%; however, BAF results for DDT in the unplanted soil treatments were unaffected or increased. The pine chip biochar utilized in this experiment did not lower the BAF of pesticides in the soil. The U.S. EPA Soil Screening Level approach was used with the measured values. Addition of 10% of the aged dairy manure compost reduced the average hazard quotient values to below 1.0 for DDT + DDE and dieldrin. Results indicate this sustainable approach is appropriate to minimize risks to wildlife in areas of marginal organochlorine pesticide contamination.

THE EFFECTS OF SOIL AMENDMENTS AND VEGETATION ON PB MOBILITY IN CONTAMINATED SHOOTING RANGE SOILS
Fayiga, A.O. and U. Saha.
International Research Journal of Environmental Sciences, Vol 5 No 2, 42-50, 2016

St. Augustine grass (*Stenotaphrum secundatum*) was planted in shooting range soils amended with either 5% phosphate rock (PR) or lime for 10 months, with unvegetated soils as control. Both lime and PR application reduced St. Augustine grass biomass, suggestive of excessive application of the amendments. Both amendments were less effective in a calcareous soil, likely due to the amendments' high calcium content. Lime reduced Pb leaching more effectively than PR, although vegetation enhanced PR effectiveness. Vegetation reduced Pb leaching but increased water-soluble Pb in the soil, with a few exceptions. Despite the pH limitation, PR reduced water-soluble Pb and plant Pb uptake more effectively than lime. PR in combination with vegetation (grasses) is recommended for Pb immobilization in shooting range soils with low pH and low Ca content.http://www.isca.in/IJENS/Archive/v5/i2/6.ISCA-IRJEVS-2015-267.pdf

BIOCHAR AS AN ELECTRON SHUTTLE FOR REDUCTIVE DECHLORINATION OF PENTACHLOROPHENOL BY *GEOBACTER SULFURREDUCENS*
Yu, L., Y. Yuan, J. Tang, Y. Wang, and S. Zhou.
Scientific Reports, Vol 5, Paper 16221, 2015

The reductive dechlorination of pentachlorophenol (PCP) by *Geobacter sulfurreducens* in the presence of different biochars was investigated to understand how biochars affect the bioreduction of environmental contaminants. Results indicated that biochars significantly accelerate electron transfer from cells to PCP, thus enhancing reductive dechlorination. The promotion effects of biochar (as high as 24-fold) in this process depend on its electron exchange capacity (EEC) and electrical conductivity (EC). A kinetic model revealed that the surface redox-active moieties (RAMs) and EC of biochar (900°C) contributed to 56% and 41% of the biodegradation rate, respectively. This work demonstrates that biochars are efficient electron mediators for the dechlorination of PCP and that both the EC and RAMs of biochars play important roles in the electron transfer process. *This paper is* ***Open Access*** *at* http://www.nature.com/articles/srep16221

BIOCHAR IN CO-CONTAMINATED SOIL MANIPULATES ARSENIC SOLUBILITY AND MICROBIOLOGICAL COMMUNITY STRUCTURE, AND PROMOTES ORGANOCHLORINE DEGRADATION
Gregory, S.J., C.W.N. Anderson, M. Camps-Arbestain, P.J. Biggs, A.R.D. Ganley, et al.
PLoS ONE, Vol 10 No 4, Paper e0125393, 2015

The effect of biochar on water-soluble arsenic (As) concentration and the extent of organochlorine degradation were examined in a co-contaminated historic sheep-dip soil during a 180-d glasshouse incubation experiment. Biochar made from willow feedstock (*Salix* sp) was pyrolyzed at 350 or 550°C and added to soil at rates of 10 g/kg and 20 g/kg (representing 30 t/ha and 60 t/ha). The isomers of hexachlorocyclohexane (HCH)—alpha-HCH and gamma-HCH (lindane)—underwent 10-fold and 4-fold reductions in concentration as a function of biochar treatment. Biochar also resulted in a significant reduction in soil DDT levels and increased the DDE:DDT ratio. Soil microbial activity increased significantly under all biochar treatments after 60 days of treatment compared to the control. 16S amplicon sequencing revealed that biochar-amended soil contained more members of the*Chryseobacterium*, *Flavobacterium*, *Dyadobacter*, and *Pseudomonadaceae*, known bioremediators of hydrocarbons. A recorded short-term reduction in the soluble As concentration due to biochar amendment possibly allowed native soil microbial communities to overcome As-related stress. *This paper is* ***Open Access*** *at* http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0125393

DESIGN, CONSTRUCTION AND PRELIMINARY RESULTS FOR AN INCLINED STORE-AND-RELEASE COVER EXPERIMENTAL CELL BUILT ON AN ABANDONED MINE SITE IN MOROCCO
Knidiri, J., B. Bussiere, R. Hakkou, M. Benzaazoua, E. Parent, and A Maqsoud.
Tenth International Conference on Acid Rock Drainage/IMWA 2015 Annual Conference, 11 pp, 2015

Four instrumented experimental cells using phosphate wastes as store-and-release (SR) covers were constructed atop (flat surface) the abandoned Kettara mine site near Marrakech, Morocco. Although results confirmed the potential of phosphate mine waste as SR cover material to control water percolation, significant uncertainties remained about the influence of inclined conditions on the hydrogeological behavior of an SR cover at the mine. The mine wastes at Kettara are retained by dykes that reach a height of 10 m. In a field investigation of the influence of slope on the Kettara SR cover's performance, an experimental field cell (10 m by 8 m) inclined at an angle of 14.5 degrees was constructed on site. The SR cover comprised 0.8 m of phosphate waste placed over a capillary break layer made of coarse-grained materials. This paper presents the design, construction, and instrumentation of an inclined SR cover, including preliminary results of the monitored parameters under natural conditions. The field test showed that slope influenced water distribution in the cover with more water at the bottom of the slope; the inclined SR cover still effectively limited water percolation under natural conditions. https://www.imwa.info/docs/imwa_2015/IMWA2015_Knidiri_073.pdf

FOLIAR HEAVY METAL CONCENTRATIONS OF 19 TREE SPECIES GROWN ON A PHYTOCAPPED LANDFILL SITE
Venkatraman, K. and N. Ashwath.
International Journal of Plant & Soil Science, Vol 4 No 2, 100-113, 2015

An alternative landfill capping technique—phytocapping (establishing plants on the waste directly, or on a layer of soil placed over the waste)—was trialed at Rockhampton, Australia. The trees perform as bio-pumps, the soil cover provides water storage, and together they minimize water percolation into the landfill, thereby reducing leachate production. At the Rockhampton landfill, 19 of the 21 installed tree species were tested to evaluate foliar and foliar litter heavy metal concentrations by species and metals cycling within the phytocapping system. The leaves evidenced little elevation of heavy metal concentrations except in *Glochidion lobocarpum*, which showed high levels of cobalt, and in *Acacia harpophylla* and *Hibiscus tiliaceus*, which showed higher levels of arsenic and cadmium, respectively. http://sciencedomain.org/download/NjE3NUBAcGV

General News

NAVFAC TECHNOLOGY TRANSFER REVIEW: SEDIMENT REACTIVE CAPPING
Naval Facilities Engineering Command, 11 pp, 2015

The Navy is interested in technological innovations to remediate contaminated sediments in a sustainable and cost-effective manner. This fact sheet provides an overview of reactive capping as an emerging contaminated sediment remediation approach, with attention to capping approaches, materials, deployment, monitoring, and case study examples.
http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/r/navfac-sed-reactive-capping.pdf

EX-SITU REMEDIATION TECHNOLOGIES FOR ENVIRONMENTAL POLLUTANTS: A CRITICAL PERSPECTIVE
Kuppusamy, S., T. Palanisami, M. Megharaj, K. Venkateswarlu, and R. Naidu.
Reviews of Environmental Contamination and Toxicology, Vol 236. Springer International Publishing, Switzerland, ISBN: 978-3-319-20012-5, 117-192, 2016

This paper presents a comprehensive survey of existing and emerging options that are suited for both in situ and ex situ remediation of contaminated sites. Off-site remediation is the primary focus of this review, and the major aspects addressed for each technology in ex situ application include technology profile, merits, drawbacks, success stories, recent advances, and future research directions.
http://www.springer.com/cda/content/document/cda_downloaddocument/9783319200125-c1.pdf?SGWID=0-0-45-1534006-p177414391

GUIDANCE FOR DEVELOPING AND IMPLEMENTING INSTITUTIONAL CONTROLS FOR LONG-TERM SURVEILLANCE AND MAINTENANCE AT DOE LEGACY MANAGEMENT SITES
U.S. Department of Energy, Office of Legacy Management.
DOE/LM-1414, 77 pp, 2015

This document is provided to help DOE LM personnel understand what is necessary and acceptable for implementing the provisions of DOE Policy 454.1, Use of Institutional Controls, for long-term surveillance and maintenance at LM sites. Institutional controls (ICs) require careful evaluation and active management. For ICs to be effective, all parties affected by their implementation—the long-term stewards; local, regional, and federal agencies; property owners; and members

of the public—must have institutional knowledge of them. This guide establishes a consistent approach to developing, implementing, maintaining, and enforcing required restrictions.
http://energy.gov/lm/downloads/guidance-developing-and-implementing-institutional-controls

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.