Technology Innovation News Survey

Entries for April 16-30, 2015

Market/Commercialization Information

SMALL BUSINESS PRE-PLACED REMEDIAL ACTION, ID/IQ, MULTIPLE AWARD TASK ORDER CONTRACT (MATOC)
U.S. Army Corps of Engineers (USACE), USACE District, Kansas City, MO.
Federal Business Opportunities, FBO-4886, Solicitation W912DQ-15-R-3003, 2015

This procurement will support work assigned to the USACE Northwestern Division and EPA Region 2 for hazardous, toxic, and radioactive waste remediation projects for both civilian and military agencies of the federal government. Environmental response actions will include remediation service and construction activities mandated by the following programs: Defense Environmental Restoration, Superfund, DoD Environmental Quality, Brownfields, Formerly Utilized Sites Remedial Action, and Base Realignment and Closure. The requirement is a small business IDIQ MATOC under NAICS code 562910. Firm-fixed-price and cost-reimbursement task orders will be written against up to 10 IDIQ contracts with a maximum shared capacity of $176.25M. Contracts will have a 3-year base period with a 2-year option. Offers are due by 2:00 PM CT on June 29, 2015. https://www.fbo.gov/spg/USA/COE/DACA41/W912DQ-15-R-3003/listing.html

MULTIPLE AWARD ENVIRONMENTAL SERVICES - OTHER ENVIRONMENTAL SERVICES, STUDIES AND ANALYTICAL SUPPORT
U.S. Army Corps of Engineers, USACE District, Baltimore, MD.
Federal Business Opportunities, FBO-4927, Solicitation W912DR-15-S-0026, 2015

The USACE Baltimore District's Environmental and Munitions Design Center is contemplating procurement of a Multiple Award Environmental Services Task Order Contract to support USACE and its customers within the assigned mission areas of the North Atlantic Division, with incidental utilization both CONUS and OCONUS. To plan this procurement, the Government is seeking responses from companies that are capable of providing a wide range of environmental services in the general areas of environmental cleanup at military and nonmilitary locations. Work may involve characterization and/or remediation of sites contaminated with hazardous, toxic, and radiological waste; munitions and explosives of concern; and munitions constituents. Businesses both large and small are encouraged to participate in this survey by submitting a brief narrative of capability by or before June 22, 2015.
https://www.fbo.gov/spg/USA/COE/DACA31/W912DR-15-S-0026/listing.html

FIXED PRICE REMEDIAL ACTION CONTRACT (FRAC), MULTIPLE AWARD CONTRACT (MAC) FOR VARIOUS SITES IN THE NAVAL FACILITIES ENGINEERING COMMAND PACIFIC (NAVFAC PACIFIC) AREA OF RESPONSIBILITY (AOR)
Naval Facilities Engineering Command, NAVFAC Pacific, Pearl Harbor, HI.
Federal Business Opportunities, FBO-4928, Solicitation N6274215R1806, 2015

This solicitation is advertised as a competitive RFP 100% set-aside for small business concerns under NAICS code 562910, with a size standard of 500 employees. The Government intends to issue the RFP on or about June 1, 2015. The Government intends to award a minimum of two IDIQ fixed-price remedial action contracts, but reserves the right to award only one contract if only one proposal is evaluated to offer the best value to the Government. The work to be ordered under this contract will be performed mainly at Navy and Marine Corps installations in the State of Hawaii on the Island of Oahu; however, work may be performed at any site within the NAVFAC Pacific AOR, including Hawaii, Guam, Japan, Okinawa, Diego Garcia, and other NAVFAC AORs. The contract performance period will consist of a base period of 12 months and four option periods of 12 months each, with a total aggregate value for all contracts not to exceed $40 million or 60 months, whichever occurs sooner.https://www.fbo.gov/spg/DON/NAVFAC/N62742/N6274215R1806/listing.html

COMMUNITY HEALTH PROJECTS RELATED TO CONTAMINATION AT BROWNFIELD/LAND REUSE SITES
Department of Health and Human Services, Centers for Disease Control and Prevention, Funding Opportunity CDC-RFA-TS15-1502, 2015

Brownfields or land reuse sites may present potentially harmful exposures from contamination from previous site uses. Community projects that address impacts of contamination at brownfield/land reuse sites further ATSDR's public health mission to promote healthy and safe environments and prevent harmful exposures. These projects will have a particular emphasis on identifying health issues prior to redevelopment and/or assessing changes in community health associated with reuse plans and redevelopment. Four awards are anticipated from estimated total program funding of $600,000. Each award ceiling is $150,000. Applications must be submitted electronically by or before 11:59 PM ET, June 22, 2015.
http://www.grants.gov/web/grants/view-opportunity.html?oppId%3D275067

AFICA AFCEC BRAC ENVIRONMENTAL CONSTRUCTION AND SERVICES REQUIREMENTS CONTRACT (BECSRC) SOLICITATIONS
Department of the Air Force, Air Force Installation Contracting Agency (AFICA)-CONUS.
Federal Business Opportunities, FBO-4935, 2015

Three final BECSRC solicitation notices have been issued as requests for proposals. Each requirement is a total small business set-aside under NAICS code 562910 to provide a full range of responsive environmental remediation actions via rapid response and removal of environmental media contamination and site restoration activities on BRAC bases in EPA Regions 1-4 (Eastern), 5-8 (Central), and 9-10 (Western), respectively. Each BECSRC will have a 5-year ordering period with 24 additional months for performance completion. These requirements contracts are designed to provide tools in place for "pop-up" interim environmental remediation requirements, i.e., unplanned, out-of-cycle requirements that occur on installations in the BRAC program. Questions about the RFPs are due no later than 2:00 PM CT, June 11, 2015.
Solicitation FA8903-15-R-0023: BECSRC Western proposals are due by 2:00 PM CT, July 13, 2015.
https://www.fbo.gov/notices/317c89a5539de8d4fcf54f6246a8ed33
Solicitation FA8903-15-R-0024: BECSRC Eastern proposals are due by 2:00 PM CT, August 3, 2015.
https://www.fbo.gov/notices/b0cbeb0587817d7493726004871751c
Solicitation FA8903-15-R-0034: BECSRC Central proposals are due by 2:00 PM CT, August 24, 2015.
https://www.fbo.gov/notices/2470810659f5c7c1d894c41c0b11feb63

Cleanup News

IN SITU REMEDIATION OF 1,4-DIOXANE USING ELECTRICAL RESISTANCE HEATING
Oberle, D., E. Crownover, and M. Kluger.
Remediation Journal, Vol 25 No 2, 35-42, 2015

Concentration reductions >99.8% of 1,4-dioxane (dioxane) have been observed in the field using electrical resistance heating (ERH). The authors discuss dioxane concentrations in air and steam extracted by an ERH vapor recovery system and the development and correlation of field data for an ERH treatment cost model for the compound. Field observations and lab testing indicate that the steam stripping that occurs through ERH remediation is an effective treatment method for dioxane. Two case studies are reported that achieved substantial dioxane concentration reductions via ERH. *See an earlier version of this paper at*http://www.thermalrx.com/technology/whitePapers/Remediation-of-1-4-Dioxane.pdf.

ISCO INJECTION INTERIM MEASURE WORK PLAN: FORMER UNISON TRANSFORMER SERVICES, INC. FACILITY, KANSAS CITY, KANSAS
Kansas Department of Health and Environment (KDHE), 32 pp, 2014

Field tasks associated with fulfilling an interim measure at the former Unison Transformer Services Inc. facility located in Kansas City, Kansas, consist of implementing in situ chemical oxidation (ISCO) in select areas on site that contain concentrations of TCE and daughter products (cis-1,2-DCE, trans-1,2-DCE, and VC) in groundwater above KDHE risk-based standards. This report discusses the site background, investigation and remediation activities, and the basis of design for sodium persulfate ISCO application.
http://kensas.kdhe.state.ks.us/beris/getDocument.kdhe_ber;jsessionid=ac101c3930d891418899e5014153911193165?D8b740.e34MahaTa3eTc40LhxyQax0NaxuSe6fznA5Pp7ftolbGmkTy?documentId=20000004KB_OTT20SRVPZPV

WOOD PRESERVERS, INC., WARSAW, VIRGINIA
U.S. EPA Region 3 Website, 2015

Corrective action at this facility is managed under a Facility Lead Agreement. In April 2014, the facility completed an interim Corrective Measures Study (CMS) to evaluate interim measures (IMs) on soil and groundwater within the areas of the former wood treating building and cylinder. Based on the interim CMS, the facility will implement in situ soil stabilization within the defined source area and continue the existing groundwater IMs—enhanced cometabolism and air sparging—in the surrounding area. The facility also will implement an in situ treatment of Cr(VI) and arsenic in groundwater, with the intent of converting Cr(VI) to the less toxic Cr(III) and increasing the site's natural attenuation capacity for arsenic. The facility is preparing a Corrective Measures Design Report for Virginia DEQ review. The facility will continue to operate its air sparging and enhanced cometabolism activities until in situ soil stabilization is implemented.

Demonstrations / Feasibility Studies

BIOAUGMENTATION AND PROPANE BIOSPARGING FOR IN SITU BIODEGRADATION OF 1,4-DIOXANE
Lippincott, D., S.H. Streger, C.E. Schaefer, J. Hinkle, J. Stormo, and R.J. Steffan.
Groundwater Monitoring & Remediation, Vol 35 No 2, 81-92, 2015

Propane biosparging and bioaugmentation were applied in a field test to promote in situ biodegradation of 1,4-dioxane (dioxane) at Site 24, Vandenberg Air Force Base, California. A propane-biosparging system consisting of a single sparging well and four performance monitoring wells was constructed in the deep aquifer. Dioxane biodegradation began immediately after bioaugmentation with *Rhodococcus ruber* ENV425 (36L; 4 x 109 cells/mL), and apparent first-order decay rates for dioxane ranged from 0.021/day to 0.036/day. First-order propane consumption rates increased from 0.01 to 0.05/min during treatment. Dioxane concentrations in the sparging well and two of the performance monitoring wells fell from as high as 1,090 µg/L to

IN SITU CHEMICAL OXIDATION/REDUCTION PILOT TEST WORK PLAN, UNION PACIFIC RAILROAD FORMER FUELING FACILITY, MARYSVILLE, KS
Kansas Department of Health and Environment (KDHE), 16 pp, 2014

This reports details the scope of work for activities associated with conducting a pilot test at the former Union Pacific Railroad fueling facility located in Marysville, Kansas. The pilot test is intended to evaluate the feasibility of using in situ chemical reduction (ISCR) for remediating the chlorinated hydrocarbon 1,1,2,2-TCA in the northern treatment area, and in situ chemical oxidation (ISCO) for residual petroleum hydrocarbon-contaminated soils beneath the site in the southern treatment area. The pilot will also obtain information needed for designing and planning full-scale technology implementation. In the northern treatment area, a mixture of Anaerobic BioChem (ABC+) and zero-valent iron will be utilized for ISCR treatment of 1,1,2,2-TCA. In the southern treatment area, ISCO will be performed through soil blending of sodium persulfate with quicklime to assist with persulfate activation and degrade contaminants through thermal mechanisms.
http://kensas.kdhe.state.ks.us/beris/getDocument.kdhe_ber;jsessionid=ac101c3930d864252463e3394c46be70d11e9148990d.e34MahaTa3eTc40Lc3aLa3uMbxb0n6jAmlGr5XDpQLvpAe?documentId=20000006LN_0V04X89505S8

BIOSPARGING STUDY DEMONSTRATES METABOLIC AND COMETABOLIC DEGRADATION OF BTEX AND PREVENTING MIGRATION ACROSS SITE BOUNDARY
Rees, A.A.
Pacific Section AAPG, SEG and SEPM Joint Technical Conference, May 3-6, 2015, Oxnard, California. American Association of Petroleum Geologists, Abstract # 90215, 2015

On-site LNAPL recovery at a site in California is nearing hydraulic endpoint, and remedial focus has shifted from pumping product to groundwater remediation. The remedial approach is to create an in situ reactive zone (IRZ) in groundwater to facilitate aerobic metabolic and cometabolic biological activity to deplete the existing methane, degrade the hydrocarbons (e.g., BTEX), and prevent off-site migration. A field study performed at a 50-ft by 50-ft area along the site boundary comprised skid-mounted biosparging and SVE systems and a grid of new biosparging, vapor extraction, and groundwater monitoring wells. The biosparging and monitoring wells were installed into three distinct geological zones between 15-40 ft bgs that exhibited a higher groundwater and contaminant flux. The biosparging system injected air into the groundwater to enhance aerobic conditions and stimulate aerobic microbial activity. The SVE system extracted air from the vadose zone to control potential volatilization. Within two weeks of system startup, an IRZ formed perpendicular to groundwater flow and expanded over the first 8 weeks of operation to at least 50 ft wide, indicated by elevated DO concentrations, depletion of methane, and significant reductions in BTEX concentrations. Biosparging and SVE were performed for a period of four months. A full-scale design is underway to prevent cross-boundary LNAPL migration.

CHEMICAL OXIDATION PERFORMANCE IN HIGH TEMPERATURE, SALINE GROUNDWATER IMPACTED WITH HYDROCARBONS
Kashir, M. and R. McGregor.
Remediation Journal, Vol 25 No 2, 55-70, 2015

Based on laboratory results, pilot-scale testing was carried out to evaluate the effectiveness of chemical oxidation using nonactivated persulfate on a high-temperature saline petroleum hydrocarbon plume at a Saudi Arabian field site. Roughly 1,750 kg of sodium persulfate was delivered to the subsurface using a series of injection wells over three injection events. Results indicated a decline in all the target compounds, with removal percentages varying between 86% for naphthalene and >99% for MTBE and TMB. BTEX compounds decreased on average by 98%. Examination of the microbial population upgradient and downgradient of the ISCO reactive zone following oxidation showed the presence of predominantly sulfate-reducing bacteria. Measurements indicated that the pH of the groundwater remained neutral following the injections, while the oxidation-reduction potential remained anaerobic throughout the injection zone with time. Nitrate concentrations decreased within the injection zone, suggesting that the nitrate may have been consumed by denitrification reactions, whereas sulfate concentrations increased as expected within the reactive zone, suggesting that the persulfate produced sulfate. The generation of sulfate as a by-product was an added benefit, as the sulfate could be utilized by the sulfate-reducing bacteria to biodegrade the remaining hydrocarbons.

Research

USING MICROBIAL COMMUNITIES TO ASSESS ENVIRONMENTAL CONTAMINATION
Yarris, L., Lawrence Berkeley National Laboratory News Release, 2015

A multi-institutional team of more than 30 scientists has found that statistical analysis of DNA from natural microbial communities can be used to identify environmental contaminants and serve as quantitative geochemical biosensors. The study was sponsored by ENIGMA, a DOE Office of Science program based at Lawrence Berkeley National Laboratory. Results are described in an Open Access paper, "Natural Bacterial Communities Serve as Quantitative Geochemical Biosensors," published in *mBio* [6(3):e00326-15] at http://mbio.asm.org/content/6/3/e00326-15.full. The researchers found that altered bacterial communities encode a memory of prior contamination, even after the contaminants themselves have been fully degraded. See additional information in the LBNL news release at http://newscenter.lbl.gov/2015/05/12/using-microbial-communities-to-assess-environmental-contamination/.

CO-METABOLIC DEGRADATION OF BENZO(E)PYRENE BY HALOPHILIC BACTERIAL CONSORTIUM AT DIFFERENT SALINE CONDITIONS
Arulazhagan, P., C. Sivaraman, S. Adish Kumar, M. Aslam, and J. Rajesh Banu.
Journal of Environmental Biology, Vol 35 No 3, 445-452, 2014

A bacterial consortium enriched from industrial sludge from a salt manufacturing company was capable of degrading phenanthrene as a sole carbon source under saline conditions but was unable to degrade high-molecular-weight benzo(e)pyrene; however, when phenanthrene was added as cosubstrate along with benzo(e)pyrene, cometabolism enhanced the biodegradation process, degrading up to 80% benzo(e)pyrene in seven days and up to 99% phenanthrene in five days at 30 g/L of NaCl concentration. The authors studied the effect of salinity on PAHs degradation and the cometabolic biodegradation of benzo(e)pyrene with phenanthrene under a range of saline conditions.
http://cees.kau.edu.sa/Files/188/Researches/65401_36750.pdf.

FIELD SCALE PHYTOREMEDIATION EXPERIMENTS ON A HEAVY METAL AND URANIUM CONTAMINATED SITE, AND FURTHER UTILIZATION OF THE PLANT RESIDUES
Willscher, S., D. Mirgorodsky, L. Jablonski, D. Ollivier, D. Merten, G. Buechel, J. Wittig, and P. Werner. Hydrometallurgy, Vols 131-132, 46-53, 2013

Field phytoremediation experiments were carried out at a former uranium mining area in East Germany. The site is contaminated slightly to moderately with heavy metals and radionuclides (HM/R). A combination of phytostabilization and phytoextraction methods incorporated microbial, soil, and plant techniques. Experiments with *Triticale*, *Helianthus annuus*, and *Brassica juncea* were performed to investigate the influence of biological additives (fungi, bacteria) and soil amendment strategies (increasing pH and organic matter, fertilizing) on biomass production and plant tolerance of heavy metals. Lysimeter experiments showed a minimization of HM/R accumulation in soil and a reduction in groundwater contamination as well as seepage water rate and load. The final utilization of HM/R loaded plant residues after harvests was studied by biogas and ethanolic fermentations and by combustion of the plant material to investigate the fate of HM/R

in the different by-products.

LONG-TERM EFFECTS OF NUTRIENT ADDITION AND PHYTOREMEDIATION ON DIESEL AND CRUDE OIL CONTAMINATED SOILS IN SUBARCTIC ALASKA
Leewis, M.-C., C.M. Reynolds, and M.B. Leigh. Alaska Branch American Society for Microbiology Meeting, May 30-31, 2014, Denali Nat'l Park, Murie Science Center, 2014

A long-term assessment of phytoremediation in Alaska capitalized on a study established in Fairbanks in 1995. The original study sought to determine how the introduction of plants (*Festuca rubra*, *Lolium multiflorum*), nutrients, or their combination would affect degradation of soil contaminated with crude oil or diesel over time. In the year following initial treatments, the plots subjected to both planting and/or fertilization showed greater overall decreases in TPH concentrations in the diesel and crude oil contaminated soils relative to untreated plots. After 15 years without active site management, re-examination of the field site showed native and non-native vegetation had colonized the site extensively, with more abundant vegetation found on diesel-contaminated soils than on crude oil-contaminated soils, which were more nutrient-poor, coarse, and acidic. TPH concentrations achieved regulatory cleanup levels in all treatment groups, with lower TPH concentrations correlating with higher amounts of woody vegetation (trees and shrubs). Bacterial community structure also varied according to the originally applied treatments.*This presentation was based on an* ***Open Access*** *journal paper at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3909700/.

COUPLED ELECTRO-KINETIC REMEDIATION AND PHYTOREMEDIATION OF METAL(LOID) CONTAMINATED SOILS
Mao, X., F.X. Han, X. Shao, and Y. Su.
Journal of Bioremediation and Biodegradation, Vol 6 No 2, 2015

This paper reviews current developments in coupled electrokinetic phytoremediation (EK-phytoremediation) technology, including the selection of plants, interactions between heavy metal(loid) input and bioavailability in soils, amendment enhancement, and key electronic parameters for the improvement of soil physical-chemical properties and plant remediation effects.
http://omicsonline.org/open-access/coupled-electrokinetic-remediation-and-phytoremediation-of-metalloid-contaminated-soils-2155-6199.1000e163.pdf

THE SYMBIOSIS BETWEEN *FRANKIA ALNI* AND ALDER SHRUBS RESULTS IN A TOLERANCE OF THE ENVIRONMENTAL STRESS ASSOCIATED WITH TAILINGS FROM THE CANADIAN OIL SANDS INDUSTRY
Mallet, P.L. and S. Roy.
Petroleum & Environmental Biotechnology, Vol 5 No 3, 180, 2014

Associations between plants and their microbial partners (bacteria and fungi) are a critical factor for their survival in harsh environments (e.g., mine waste areas). The plants of interest are mostly alder, particularly shrubs whose nitrogen requirements are met by the symbiotic, nitrogen-fixing*Frankia* sp. bacteria that associate with them at root level. Alder seedlings inoculated in the nursery with *Frankia* sp. and/or mycorrhizal fungi have increased survival rates and accelerated growth when planted on mine sites compared to noninoculated alder stock. Depending upon the alder species and specific type of mine residue, survival rates were two to four times greater, and aerial biomass development was three to four times greater. Site soil quality may be improved at an accelerated pace through leaf fall. Alder leaves are particularly rich in nitrogen, which is often an operational consideration. When properly harnessed, the symbiotic mechanisms can reduce or even eliminate the need for supply and transport of organic amendments during site preparation. Hardy, symbiotic alder shrubs also sequester CO_2, which may help reduce the environmental cost of rehabilitation operations by providing continuous and quantifiable carbon capture. http://omicsonline.org/open-access/the-symbiosis-between-frankia-alni-and-alder-shrubs-results-in-a-tolerance-of-the-environmental-stress-2157-7463.1000180.pdf

IMPACT OF ELECTRODE SEQUENCE ON ELECTROCHEMICAL REMOVAL OF TRICHLOROETHYLENE FROM AQUEOUS SOLUTION
Rajic, L., N. Fallahpour, and A.N. Alshawabkeh.
Applied Catalysis B: Environmental, Vols 174-175, 427-434, 2015

In a study of the effect of placing the anode downstream from the cathode and using multiple electrodes to promote TCE reduction, experiments were conducted with a cathode followed by an anode and an anode followed by a cathode using mixed-metal oxide and iron as electrode materials. Enhanced reaction rates observed in this study suggest that a mixed flow-through electrochemical cell with multiple cathodes upstream of an anode is an effective method to promote the reduction of TCE in groundwater.
Background information: http://www.northeastern.edu/protect/research/p5/
Poster Presentation: http://www.northeastern.edu/protect/assets/Lily_SETAC_Poster.pdf

SORPTION OF POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) TO BIOCHAR AND ESTIMATES OF PAH BIOAVAILABILITY
Holm, T.R., M.L. Machesky, and J.W. Scott.
Illinois Sustainable Technology Center, RR-124, 86 pp, 2015

Biochars were produced by slow pyrolysis of corn stover under a nitrogen atmosphere at 450°, 550°, and 750°C. The chars were subjected to artificial aging by repeated freezing and thawing or incubating moist char at 60° and 110°C. A total of 12 materials was produced and characterized. Pyrene was used as a probe compound. Pyrene sorption was strong for all chars, with the amount sorbed at 1µg/L dissolved pyrene ranging from 10^6 to over 10^7 µg/kg. Aging had small but measureable effects on both sorption and HPCD extraction of pyrene. https://www.ideals.illinois.edu/handle/2142/72653

A CRITICAL EVALUATION OF MAGNETIC ACTIVATED CARBON'S POTENTIAL FOR THE REMEDIATION OF SEDIMENT IMPACTED BY POLYCYCLIC AROMATIC HYDROCARBONS
Han, Z., B. Sani , J. Akkanen, S. Abel, I. Nybom, H.K. Karapanagioti, and D. Werner.
Journal of Hazardous Materials, Vol 286, 41-47, 2015

This study explored the use of a coal-based magnetic activated carbon (MAC) for PAH remediation. An 8.1% MAC amendment (w/w, equal to 5% AC content) was found to be as effective as 5% (w/w) pristine AC in reducing aqueous PAHs by 98% within three months. MAC recovery from sediment after three months was 77%. Incomplete MAC recovery had both positive and negative effects. A slight rebound of aqueous PAH concentration was observed following MAC recovery, but concentrations dropped again after six months, likely due to the presence of the 23% unrecovered MAC. The 77% recovery of the 8.1% MAC dose, however, was insufficient to reduce ecotoxic effects of fine-grained AC or MAC amendment on the egestion rate, growth, and reproduction of the AC-sensitive species *Lumbriculus variegates*.

SOIL WASHING OPTIMISATION AND ASSESSMENT OF THE RESIDUES WITH FOCUS ON COPPER: A METHOD TO TREAT METAL CONTAMINATED SITES
Khmilkovska, Nelly, Master's thesis, Chalmers University of Technology, Gothenburg, Sweden, 59 pp, 2014

Soils severely contaminated with Cu and other toxic metals were subjected to a washing method using two leachants successively: acidic wastewater (a by-product from incineration) followed by ordinary water to dissociate toxic metals from the soil matrix. Findings showed that the acidic wastewater removed some toxic metals effectively from the soil matrix, particularly Cu (~90%); however, high leaching of Cu did not yield soil clean enough to be returned to the original site, although the treatment achieved compliance with Swedish guidelines for nonhazardous waste disposal. The importance of pretreating the wastewater prior using it for washing was emphasized when the final residues demonstrated an ability to adsorb mercury from the wastewater. The changes in soil structure did not affect its quality significantly. http://publications.lib.chalmers.se/records/fulltext/202952/202952.pdf

A *PSEUDOMONAS PUTIDA* STRAIN GENETICALLY ENGINEERED FOR 1,2,3-TRICHLOROPROPANE BIOREMEDIATION
Samin, G., M. Pavlova, M.I. Arif, C.P. Postema, J. Damborsky, and D.B. Janssen.
Applied and Environmental Microbiology, Vol 80 No 17, 5467-5476, 2014

1,2,3-Trichloropropane (TCP), a toxic compound, is recalcitrant to biodegradation in the environment. Attempts to isolate TCP-degrading organisms using enrichment cultivation have failed; however, a potential biodegradation pathway starts with hydrolytic dehalogenation to 2,3-dichloro-1-propanol (DCP), followed by oxidative metabolism, and to obtain a practically applicable TCP-degrading organism, researchers introduced an engineered haloalkane dehalogenase with improved TCP degradation activity into the DCP-degrading bacterium *Pseudomonas putida* MC4. Growth of the resulting engineered bacterium, *P. putida* MC4-5222, on TCP was indeed observed, and all organic chlorine was released as chloride. A packed-bed reactor with immobilized cells of strain MC4-5222 degraded >95% of influent TCP (0.33 mM) under continuous-flow conditions, with stoichiometric release of inorganic chloride, demonstrating the successful use of a laboratory-evolved dehalogenase and genetic engineering to produce an effective, plasmid-free, and stable whole-cell biocatalyst for the aerobic bioremediation of a recalcitrant chlorinated hydrocarbon.
http://loschmidt.chemi.muni.cz/peg/wp-content/uploads/2014/09/aem14.pdf

General News

TECHNICAL GUIDELINES ON PERFORMING A SEDIMENT EROSION AND DEPOSITION ASSESSMENT (SEDA) AT SUPERFUND SITES
Hayter, E., K. Gustavson, S. Ells, J. Gailani, J. Wolfe, T. Dekker, and T. Redder.
ERDC TR-14-9, 183 pp, 2014

This report outlines the processes that influence sediment transport and describes methods to use in developing a sediment erosion and deposition assessment (SEDA) at a designated Superfund site. A SEDA is a complex procedure that overlaps multiple processes, properties, and disciplines and includes consideration of sediment characteristics, groundwater movement, surface water stresses, sediment loadings, anthropogenic activity, and weather and oceanographic influences. Historical data also can provide a long-term record of system evolution, which not only is critical in assessing sediment erodibility but also supports conceptual site model development. The most successful SEDA studies have been guided by a technical review panel working with an RPM in SEDA development. Understanding of processes at a specific site, coupled with experience from other sites, is also critical to success.
http://el.erdc.usace.army.mil/elpubs/pdf/tr14-09.pdf

INTEGRATED DNAPL SITE CHARACTERIZATION AND TOOLS SELECTION
Interstate Technology & Regulatory Council (ITRC), Integrated DNAPL Site Characterization Team. ISC-1, 381 pp, 2015

Current knowledge about DNAPL site characterization and remediation has been integrated into this Web-based document to develop a resource that can inform regulators, consultants, and other interested parties of the critical concepts related to characterization approaches and tools for collecting subsurface data at DNAPL sites. Coverage includes identifying site conditions to considered when developing an informative DNAPL conceptual site model; defining an objectives-based DNAPL characterization strategy; understanding the tools and resources that are available to improve the identification, collection, and evaluation of site characterization data; and selecting appropriate technologies to fill site-specific data gaps. Case studies are provided to illustrate the concepts. http://www.itrcweb.org/DNAPL-ISC_tools-selection/

BEST PRACTICE GUIDANCE FOR PRACTICAL APPLICATION OF GENTLE REMEDIATION OPTIONS (GRO)
Puschenreiter, M. et al.
The GREENLAND Project, 18 pp + 61 pp appendices, 2014

Gentle remediation options (GRO) are risk management strategies or techniques for contaminated sites that result in a net gain (or at least no gross reduction) in soil functionality. The following phytotechnologies have been implemented as GROs: phytoextraction, phytodegradation, phytotransformation, rhizodegradation, rhizofiltration, phytostabilization, phytovolatilization, in situ immobilization, and phytoexclusion. These plant-based strategies and techniques have been applied successfully at sites affected by a range of organic, inorganic, and radioactive contaminants. This document focuses on GRO application at sites contaminated with trace elements (metal and metalloid). The guide and its appendices are accompanied at by a decision support tool for selecting the most suitable GRO for site-specific conditions. http://www.greenland-project.eu/

PHYTO: PRINCIPLES AND RESOURCES FOR SITE REMEDIATION AND LANDSCAPE DESIGN
Kirkwood, N. and K. Kennen.
Routledge, New York. ISBN: 978-0-415-81415-7, 346 pp, 2015

This text presents the concepts of phytoremediation and phytotechnology in one comprehensive guide, illustrating the consideration of plants for the uptake, removal, or mitigation of on-site pollutants. Current scientific case studies highlight the advantages and limitations of plant-based cleanup. Typical contaminant groups found in the built environment are explained, and plant lists for mitigation of specific contaminants are included where applicable. This book addresses the benefits of phytotechnologies from a design point of view, taking complex scientific terms and translating the research into an easy-to-understand reference for those involved in creating planting solutions. This text presents the concept of "phytobuffering," which is the creation of protective planting designs with preventive phytotechnology abilities where future pollution might be expected. The authors guide the reader through the process of selecting plants for their aesthetic and environmental qualities, combined with their contaminant-removal benefits. Some of the ideas in the book are illustrated by the authors in a "Phyto Practicum" course handout at http://isites.harvard.edu/fs/docs/icb.topic1326493.files/Class%201-%20Part%201-%20Phyto%20Introduction%20and%20Fundamentals.pdf

ENHANCED REDUCTIVE DECHLORINATION (ERD) DESIGN CONSIDERATIONS
Durant, N., L. Smith, and W. Condit.
TM-NAVFAC-EXWC-EV-1501, 49 pp, 2015

ERD is a type of enhanced in situ bioremediation used to promote anaerobic biological dechlorination of chlorinated solvents in the subsurface by both direct and cometabolic degradation processes. ERD involves delivery into the subsurface of amendments (biostimulation) and in some cases specialized bacteria (bioaugmentation) to stimulate specific dechlorinating biodegradation reactions. This document was developed for the U.S. Navy to lay out a framework for ERD design submittals, including a summary of best practices for bioremediation design, tips for appropriate QA/QC measures, and a listing of standards and references. To be posted at http://clu-in.org/EXWC-EV-1501.

IN SITU CHEMICAL OXIDATION DESIGN CONSIDERATIONS
Rosansky, S., D. Nair, and W. Condit.
TM-NAVFAC-EXWC-EV-1502, 42 pp, 2015

This document was developed for the U.S. Navy to provide a framework for in situ chemical oxidation (ISCO) design submittals. It offers a summary of best practices for ISCO design, appropriate QA/QC measures, and available standards and references. To be posted at http://clu-in.org/EXWC-EV-1502.

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.

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