Technology Innovation News Survey

Entries for November 16-30, 2015

Market/Commercialization Information

EXTRACTING METALS, METTALLOIDS, SULFATE
Department of the Interior, U.S. Geological Survey, Denver, CO.
Federal Business Opportunities, FBO-5043, Solicitation G16PS00138, 2015

USGS is requesting information on technologies under development or in use for extracting metals, metalloids, and/or sulfate from acid surface or groundwaters contaminated by metal mining activities for reuse or recycling. USGS is developing geochemical codes that simulate mineral solubilities and related reactions relevant to weathering of sulfide-bearing mines and mineral deposits; secondary recovery of materials from mineral processing wastes; and extraction of metals from acid mine drainage. USGS seeks to assess the feasibility of applying its developed geochemical codes to extraction and resource recovery operations for optimizing and improving operational efficiency. Respondents are encouraged to provide information about the approximate range of chemical composition (concentrations, pH, and temperature) for which geochemical computations would be applicable. The long-term objective is to provide federal land managers, federal and state regulators, industry partners, and the mining industry with alternative means of addressing hazardous waste from mine sites in place of the current expensive remedial measures, and also to disseminate computer simulations that support evaluation of alternatives. Submit responses by 5:00 PM MT on January 22, 2016.
https://www.fedconnect.net/FedConnect/?doc=G16PS00138&agency=DOI [*Note: it might be necessary to copy and paste this URL into your browser*]

FWDA PARCEL 3 CLOSURE & CORRECTIVE ACTION AT FORT WINGATE DEPOT ACTIVITY, MCKINLEY COUNTY, NEW MEXICO
Department of the Army, U.S. Army Corps of Engineers, USACE District, Tulsa.
Federal Business Opportunities, FBO-5043, Solicitation W912BV-16-R-0055, 2015

The requirement is for a performance-based approach for closure actions at the Hazardous Waste Management Unit and Corrective Action Management Unit, and corrective action at other sites in Parcel 3 at Fort Wingate. This acquisition will be an unrestricted procurement for a C-type firm-fixed-price contract with an estimated period of performance of 8 years. Release of the solicitation via FedBizOpps is anticipated on or about January 11, 2016. The official RFP will provide details of a preproposal conference in Gallup and a windshield tour of the project site, tentatively scheduled for January 20, 2016.
https://www.fbo.gov/spg/USA/COE/DACA56/W912BV-16-R-0055/listing.html

INSTALLATION ROBOTICS SOURCES SOUGHT
Department of the Army, U.S. Army Corps of Engineers, USACE HNC, Huntsville, AL.
Federal Business Opportunities, FBO-5042, Solicitation Installation_Robotics, 2015

This synopsis is for market research purposes only. The U.S. Army Engineering and Support Center, Huntsville, is considering award of an IDIQ SATOC to provide ordnance clearance services where those services are performed using robotic equipment to the maximum extent possible. Manned UXO services will be required in support of the robotic operation, primarily during the construction of training ranges on active military, guard, and reserve locations, and at formerly used defense sites where a clearance action is required. Interested firms are invited to provide a brief narrative and responses to the Capabilities Questionnaire. Responses must be received by 2:00 PM CT on January 29, 2016. https://www.fbo.gov/spg/USA/COE/DACA87/Installation_Robotics/listing.html

Cleanup News

DEVELOPMENT OF IN SITU REMEDIATION OF CONTAMINATED SEDIMENTS WITH ACTIVATED CARBON AND TRANSITION TO PRACTICE
American Academy of Environmental Engineers and Scientists, 2015 Honor Award: University Research, 2015

The development of an in situ sediment remediation technology using activated carbon (AC) as an amendment to contaminated sediment is an innovation from the laboratory of Dr. Upal Ghosh of the University of Maryland, Baltimore, in collaboration with Dr. Charles A. Menzie. The novel patented (U.S. Patent 7,824,129) delivery technology has been commercialized as SediMite™. AC is a highly porous material with a low bulk density, and its application to sediment through the water column is challenged by the potential of the carbon to be entrained and washed away. This challenge was met by blending AC with sand and clay to make the engineered Sedimite pellets, which have sufficient strength and density to be handled in bulk and deployed through water, where they disintegrate over a period of days and are incorporated in sediments by natural mixing processes. As part of the technology transition effort, the first full-scale application of the SediMite technology was implemented in a 5-acre lake in Dover, Delaware, in November 2013, where the successful use of this novel technology reduced PCB concentrations in sediment porewater, the water column, and fish.
http://www.aaees.org/e3competition-winners-2015honor-universityresearch.php

REQUEST FOR A NON-TIME CRITICAL REMOVAL ACTION AT THE NUCLEAR METALS, INC. SUPERFUND SITE, CONCORD, MASSACHUSETTS: ACTION MEMORANDUM
U.S. EPA Region 1, 17 pp, 28 Sep 2015

At the 46-acre Nuclear Metals Inc. site—also known as the Starmet Corporation site—Nuclear Metals made depleted uranium products, primarily for armor-piercing ammunition. It also manufactured metal powders for medical applications, photocopiers, and specialty metal products, such as beryllium tubing used in the aerospace industry. From 1958 to 1985, waste was discharged into an unlined holding basin, contaminating the soil and groundwater with hazardous chemicals. EPA's Record of Decision (September 28, 2015) for the site generally includes the following components: (1) excavation and off-site disposal of ~82,500 yd^3 of contaminated materials; (2) in situ stabilization of depleted uranium-contaminated soils in the Holding Basin using apatite injection; (3) extraction and ex situ treatment of groundwater for VOCs and 1,4-dioxane; (4) in situ treatment of depleted uranium and natural uranium in groundwater; (5) long-term monitoring; and (6) institutional controls. As part of the ROD, EPA also decided to accelerate the 1,4-dioxane cleanup in groundwater. The approximate cost for EPA's cleanup decision is estimated at $125M. http://semspub.epa.gov/src/document/01/582999 *See details in the 2015 ROD —* http://semspub.epa.gov/src/document/01/582996 *— and the Feasibility Study —* http://semspub.epa.gov/src/document/01/568423.

REMEDIATING FORMER CHEMICAL MANUFACTURING SITES
Pang, L., C. Taylor-King, and P. Fitch.
Third International Conference on Sustainable Remediation, 17-19 September 2014, Ferrara, Italy. 43 slides, 2014

A legacy of contamination left beneath a former chemical experimental facility covering an area of 5.6 ha comprised a wide range of chlorinated solvents, including trichlorethanes, tetrachlorethanes, TCE, and PCE. The assessment of the likely location of DNAPL considered the cumulative concentration of chlorinated solvents and their combined effective solubility to target key areas for remediation. High vacuum extraction (HVE) was applied to all of the treatment areas first to recover mobilized hydrocarbon mass prior to targeting the residual mass with injections of activated hydrogen peroxide for in situ chemical oxidation (ISCO). Over 130 multi-purpose extraction and chemical injection wells were installed across an area of ~8,300 m2. Four dedicated HVE and two chemical injection systems were mobilized to ensure remediation could be completed on schedule. Following completion of the HVE phase, which recovered almost 17 tonnes of chlorinated hydrocarbon mass, the areas of highest remaining chlorinated solvent concentrations in groundwater were identified through a high-density groundwater monitoring regime and then treated using ISCO. Almost 600 m^3 of

chemical oxidant was injected and post-injection monitoring demonstrated that the oxidant had been delivered successfully as per the design. Up to a 98% reduction in dissolved-phase concentration was observed.
http://www.sustrem2014.com/Theme%204.1/Chris_King_162.pdf

SUSTAINABLE GAS POWERED IN-SITU THERMAL DESORPTION TO REMEDIATE PCBS IN LOW PERMEABILITY SOILS AT A FACILITY IN SPAIN

Dablow, J., J. Baldock, M. Mantecon, and A. Villanueva.
Third International Conference on Sustainable Remediation, 17-19 September 2014, Ferrara, Italy. 16 slides, 2014

Investigations at a site historically used for the servicing and repair of motors and transformers identified the presence of mainly PCBs at concentrations up to 27,700 mg/kg within underlying low permeability silts and clays. Although the impact generally decreased with depth, no clear distribution was identified, suggesting multiple point sources. A remedial target was derived of 4.4mg/kg for PCBs in soil. Although soil excavation and disposal was preferred initially, the nearest licensed soil disposal facilities are hundreds of kilometers away, and an alternative, more sustainable option of in situ thermal desorption (ISTD) was selected. The heat was supplied by gas-powered thermal technology, one of the first applications of its kind in Europe. The ISTD heaters were powered by propane rather than electricity as the site has an insufficient mains supply and a generator was considered infeasible. Heating progress was monitored over a period of 23 weeks via a series of thermocouples to see if the target temperature (300°C) was achieved. Engineers estimated ~1,050 kg PCBs would be recovered and an additional 250 kg destroyed in situ during operation. At the time of this report, the system had recovered 1,550 kg PCBs. http://www.sustrem2014.com/Theme%204.1/James_Baldok_130.pdf

Demonstrations / Feasibility Studies

DEVELOPMENT AND VALIDATION OF A QUANTITATIVE FRAMEWORK AND MANAGEMENT EXPECTATION TOOL FOR THE SELECTION OF BIOREMEDIATION APPROACHES AT CHLORINATED ETHENE SITES

Lebron, C., T. Wiedemeier, J. Wilson, F. Loeffler, R. Hinchee, and M. Singletary.
ESTCP Project ER-201129, 178 pp, 2015

The overarching project objective was to develop and validate a framework for making bioremediation decisions based on site-specific physical and biogeochemical characteristics and constraints. The key deliverable is called BioPIC, an easy-to-use decision tool for estimating and integrating the impact of quantifiable parameters on natural attenuation and microbial remedies to achieve detoxification of chlorinated ethenes. The quantitative framework and BioPIC were beta-tested for chlorinated ethenes (mainly PCE, TCE, and daughter products) degradation at multiple sites: (1) NAS North Island, Site 5, Unit 2 (complete anaerobic biological reductive dechlorination); (2) Kings Bay, Site 11 (reductive dechlorination in the source zone leading to subsequent oxidation of degradation products downgradient); (3) Hill AFB OU-10 (aerobic oxidation); and (4) Plattsburgh AFB, Fire Training Area 2 (abiotic reductive dechlorination or elimination reactions). https://www.serdp-estcp.org/content/download/37095/354098/file/ER-201129-FR.pdf
See the BioPIC tool and additional information at
https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Persistent-Contamination/ER-201129.

PASSIVE PE SAMPLING IN SUPPORT OF IN SITU REMEDIATION OF CONTAMINATED SEDIMENTS: FINAL REPORT

Gschwend, P. and K. Palaia.
ESTCP Project ER-200915, 87 pp, 2015

This project sought to demonstrate (a) polyethylene (PE) passive sampling effectively evaluates porewater concentrations of contaminants; (b) PE can delineate the horizontal and vertical extent of contamination; (c) PE is suited for long-term monitoring; and (d) the PE passive sampling approach is commercially viable. Lab tests showed the PE samplers measured pore waters more accurately than the common commercial practice of using sediment concentrations. PE sampling readily revealed the distribution of sediment contamination by PCBs at the demonstration site. PE samplers showed the site had pg/L levels of individual PCBs in pore waters and bottom waters. Sand-cap data indicated no upward PCB fluxes through the caps. Finally, QA/QC, sensitivity, ease of use, and cost metrics all supported the conclusion that PE passive sampling is commercially viable.
https://www.serdp-estcp.org/content/download/37112/354243/file/ER-200915-FR.pdf

METHODS FOR MINIMIZATION AND MANAGEMENT OF VARIABILITY IN LONG-TERM GROUNDWATER MONITORING RESULTS: ESTCP COST AND PERFORMANCE REPORT

McHugh, T.E., P.R. Kulkarni, C.J. Newell, and S.L. Britt.
ESTCP Project ER-201209, 50 pp, 2015

The project purpose was to (1) validate sample collection methods and procedures that minimize variability in groundwater monitoring results, and (2) validate improved methods to optimize monitoring frequency and assess long-term concentration trends that better account for short-term variability in groundwater monitoring results. The field demonstration was conducted in eight monitoring wells each at a Texas and a California demonstration site. Results indicated that the sample method (except active no-purge) has only a modest impact on monitoring variability and concentration, suggesting sampling methods could be selected based on factors such as cost, ease of implementation, and sample volume requirements rather than concerns regarding data quality. Low-flow standard (purging to parameter stability) and low-flow alternative (small volume) showed the lowest variability at both sites. Results were consistent between the two sites except for the active no-purge (HydraSleeve) method, which was more variable at the California site than the Texas site. Low-flow small-volume purge and passive no-purge (SNAP sampler) were the two most effective sampling methods based on the combined goals of minimizing monitoring cost and minimizing variability in monitoring results.
https://www.serdp-estcp.org/content/download/36932/352841/file/ER-201209-CP.pdf

ADVANCED THERMO-CHEMICAL SEDIMENT DECONTAMINATION PROCESSING FOR UNITED STATES URBAN SUPERFUND SITES

Stern, E.A., E. Peck, M. Mensinger, A. Hendricks, R. Fabricant, B. Beckstrom, D. Leavitt, and K.W. Jones.
8th International Conference on Remediation and Management of Contaminated Sediments, 12-15 January 2015, New Orleans, Louisiana. Battelle Press, Columbus, OH. Poster, 2015

This poster describes the development of the Cement Lock™ thermo-chemical rotary kiln sediment decontamination technology. The goal is beneficial use of contaminated sediment as construction-grade cement in a complex urban coastal region and implementation of the technology at a regional sediment processing facility in the Port of New York/New Jersey.
https://www.montclair.edu/profilepages/media/2293/user/cement_lock_battelle_poster_final_stern.pdf

START-UP OF A PASSIVE REMEDIATION BIOREACTOR FOR SULFATE AND SELENIUM REMOVAL FROM MINE TAILINGS WATER

Baldwin, S., P. Mirjafari, M. Rezahdebashi, G. Subedi, J. Taylor, L. Moger, K. McMahen, and A. Frye.
Proceedings of the 10th ICARD & IMWA Annual Conference, Santiago, Chile. Paper 132, 2015

Before tailings pond water can be discharged to the environment in British Columbia it must meet very stringent local water quality requirements: selenium must be https://www.imwa.info/docs/imwa_2015/IMWA2015_Baldwin_132.pdf

Research

PASSIVE SAMPLING OF POLYCHLORINATED BIPHENYLS (PCB) IN INDOOR AIR: TOWARDS A COST-EFFECTIVE SCREENING TOOL

Vorkamp, K. and P. Mayer.

Aarhus University, Scientific Report from DCE (Danish Centre for Environment and Energy) No. 128, 120 pp, 2015

PCBs were widely used in construction materials in the 1960s and 1970s. Researchers evaluated the use of passive sampling techniques to develop a simple and cost-effective screening tool for PCBs in indoor air. The project combined a literature review, lab experiments, and measurements in buildings potentially containing PCBs in indoor air. The lab experiments showed a strong influence of air velocity on PCB partitioning between air and the passive sampler. Based on the results of the first two phases and comments from experts in the field of PCB-containing construction materials, a kinetic sampler (petri dish with silicone) and a potential equilibrium sampler (silicone-coated paper) were tested in buildings. Calibration and validation were based on conventional active sampling for both methods in their kinetic sampling phase. The methods were sensitive and precise, but tended to overestimate the concentration obtained by active sampling. http://dce2.au.dk/pub/SR128.pdf

LOW DENSITY POLYETHYLENE (LDPE) PASSIVE SAMPLERS FOR THE INVESTIGATION OF PCB POINT SOURCES IN RIVERS

Estoppey, N., J. Omlin, A. Schopfer, P. Esseiva, E. Vermeirssen, O. Delemont, and L.F. De Alencastro.
Chemosphere, Vol 118, 268-276, 2015

A passive sampling approach for routine investigation of PCB sources in rivers consists of deploying LDPE strips downstream and upstream of potential PCB sources as well as in the water discharges. Concentrations of indicator PCBs (iPCBs) absorbed in samplers from upstream and downstream sites are compared to reveal increases of PCB levels. Water velocity can vary greatly along a river stretch and influence uptake at each site in a different way; hence, differences in velocity must be taken into account to correctly interpret absorbance. LDPE strips were exposed to velocities between 1.6 and 37 cm/s using a channel system built in the field. Relationships between velocity and absorbance were established for each iPCB to determine the expected change due to velocity variations. The method was applied in the Swiss river Venoge initially to conduct a primary investigation of potential PCB sources and subsequently to conduct thorough investigations of two suspected sources.

SORBENT POLYMER EXTRACTION AND REMEDIATION SYSTEM (SPEARS)

Kohler, J.
Kennedy Space Center, Florida.

NASA's Kennedy Space Center has developed a novel method for removing PCBs in situ from sediment systems. The technology consists of a redeployable polymer blanket that attracts and absorbs PCBs. The invention is designed to be deployed in individual rectangular segments that can be hooked together to form a blanket. The bottom piece of each segment is molded from polymer and contains numerous hollow star-shaped spikes. Each segment is solid on top, except for a hermetically sealed opening through which solvent (e.g., ethanol) is introduced and extracted. Gaskets on the edges of the top and bottom pieces of a segment provide a hermetic seal when the pieces are fastened together so that if any segment develops a leak, the solvent loss is limited to that one segment. NASA researchers developed a two-step approach for PCB removal and treatment. In step one the polymer blanket is placed atop the contaminated sediment. Spikes in the blanket project into the sediment and attract PCBs through the polymer into the solvent until equilibrium is achieved. In step two the blanket is removed from the sediment to allow extraction of the now PCB-laden solvent. Following extraction, the solvent is treated ex situ using a derivative of a patented NASA PCB treatment technology (the Activated Metal Treatment System) to break down the PCBs into benign by-products. The blanket then can be decontaminated, refilled with fresh solvent, and deployed again. http://contest.techbriefs.com/2015/entries/sustainable-technologies/5712
Additional information: http://technology.nasa.gov/patent/KSC-TOPS-10

MICROBIAL COMMUNITY ANALYSIS OF SWITCHGRASS PLANTED AND UNPLANTED SOIL MICROCOSMS DISPLAYING PCB DECHLORINATION

Liang, Y., R. Meggo, D. Hu, J.L. Schnoor, and T.E. Matte.
Applied Microbiology and Biotechnology, Vol 99 No 15, 6515-6526, 2015

Bacterial communities in soil microcosms spiked with PCB 52, 77, and 153 were investigated for the influence of their exposure to planted switchgrass (*Panicum virgatum*). Redox cycling (i.e., sequential periods of flooding followed by periods of no flooding) was performed in an effort to promote PCB dechlorination. Lesser chlorinated PCB transformation products were detected in all microcosms, indicating PCB dechlorination occurrence. Terminal-restriction fragment-length polymorphism and clone library analysis showed that PCB spiking, switchgrass planting, and redox cycling affected the microbial community structure. Putative organohalide-respiring *Chloroflexi* populations, which were not found in unflooded microcosms, were enriched after 2 weeks of flooding in the redox-cycled microcosms. Sequences classified as *Geobacter* sp. were detected in all microcosms and were most abundant in the switchgrass-planted microcosm spiked with PCB congeners. The presence of possible organohalide-respiring bacteria in these soil microcosms suggests that they play a role in PCB dechlorination. *Additional information*: https://tools.niehs.nih.gov/srp/researchbriefs/view.cfm?Brief_ID=244

BIOFILMS AT WORK: BIO-, PHYTO- AND RHIZOREMEDIATION APPROACHES FOR SOILS CONTAMINATED WITH POLYCHLORINATED BIPHENYLS

Horwat, M., M. Tice, and B.V. Kjellerup.
AIMS Bioengineering, Vol 2 No 4, 324-334, 2015

Naturally occurring organohalide-respiring bacteria possess the enzymes necessary to degrade PCB compounds to non-toxic products. The efficiency of PCB degradation can be improved by facilitating the formation of organohalide-respiring biofilms. During biofilm colonization on a surface or interface, bacteria are encased in an extracellular polymeric substance (slime), which allows them to share nutrients and remain protected from environmental stresses. Effective bioremediation of PCBs involves facilitation of biofilm growth to promote cooperation between bacteria, which can be further enhanced by the presence of certain plant species. This review offers an overview of biofilm processes involved in the detoxification of PCBs, including anaerobic and aerobic PCB degradation by bacteria as well as the ability of plants to stimulate microbial activity and degradation (rhizoremediation and phytoremediation).
http://www.aimspress.com/fileOther/PDF/Bioengineering/201504324.pdf

EQUILIBRIUM SAMPLING OF POLYCHLORINATED BIPHENYLS IN RIVER ELBE SEDIMENTS: LINKING BIOACCUMULATION IN FISH TO SEDIMENT CONTAMINATION

Schaefer, S., C. Antoni, C. Moehlenkamp, E. Claus, G. Reifferscheid, P. Heininger, and P. Mayer.
Chemosphere, Vol 138, 856-862, 2015

Equilibrium sampling can be applied to measure freely dissolved concentrations of hydrophobic organic chemicals (HOCs) that are considered effective concentrations for diffusive uptake and partitioning. It also can yield concentrations in lipids at thermodynamic equilibrium with the sediment by multiplying concentrations in the equilibrium sampling polymer with lipid-to-polymer partition coefficients. Scientists applied silicone-coated glass jars for equilibrium sampling of seven indicator PCBs in sediment samples from 10 locations along the River Elbe to measure dissolved concentrations of PCBs and their lipid concentrations. For three sites, researchers then related the sediment lipid concentrations to lipid-normalized PCB concentrations determined independently by the German Environmental Specimen Bank in common bream. Results confirm the close link between PCB bioaccumulation and the thermodynamic potential of sediment-associated HOCs for partitioning into lipids. This novel approach gives clearer and more consistent results compared to conventional approaches based on total concentrations in sediment and biota-sediment accumulation factors. *This paper is* ***Open Access*** *at* http://www.sciencedirect.com/science/article/pii/S0045653515300333.

REMEDIATION OF A HISTORICALLY PB CONTAMINATED SOIL USING A MODEL NATURAL MN OXIDE WASTE

McCann, C.M., N.D. Gray, J. Tourney, R.J. Davenport, M. Wade, N. Finlay, K.A. Hudson-Edwards, and K.L. Johnson.
Chemosphere, Vol 138, 211-217, 2015

A natural manganese oxide (NMO) waste, a large international source of Mn mining industry by-product, was assessed as an in situ

remediation amendment for Pb-contaminated sites. Treatment viability was investigated in a 10-month lysimeter trial in which a historically Pb-contaminated soil was amended with a 10% by weight model NMO. The model NMO was found to have a large Pb adsorption capacity, but owing to the heterogeneous nature of the soil Pb contamination (3,650.54 to 9,299.79 mg/kg), no treatment-related difference in Pb via geochemistry could be detected. To overcome difficulties in traditional geochemical techniques arising from pollutant heterogeneity, the authors developed a new method for proving metal sorption to in situ remediation amendments by combining two spectroscopic techniques: electron probe microanalysis and X-ray photoelectron spectroscopy. The new technique revealed Pb immobilization on NMO, which was Pb-free prior to its addition to the soil. Amendment of the soil with exogenous Mn oxide had no effect on microbial functioning, nor did it perturb the composition of the dominant phyla. *This paper is **Open Access** at* http://www.sciencedirect.com/science/article/pii/S0045653515005172.

TEMPORAL EVOLUTION OF BACTERIAL COMMUNITIES ASSOCIATED WITH THE IN SITU WETLAND-BASED REMEDIATION OF A MARINE SHORE PORPHYRY COPPER TAILINGS DEPOSIT

Diaby, N., B. Dolda, E. Rohrbach, C. Holliger, and P. Rossi.
Science of the Total Environment, Vol 533, 110-121, 2015

Temporal changes in bacterial community composition were documented during the remediation of a section of porphyry copper tailings deposited on the Bahia de Ite shoreline (Peru). An experimental remediation cell was flooded and transformed into a wetland to prevent oxidation processes. The top oxidation zone of the tailings deposit initially displayed a low pH (3.1) and high concentrations of metals, sulfate, and chloride in a sandy grain size geological matrix. Sulfur- and iron-oxidizing bacteria, such as *Leptospirillum* spp., *Acidithiobacillus* spp., and *Sulfobacillus* spp., dominated this microbial community. After wetland implementation, the cell was water-saturated, the acidity was consumed, and metals dropped to a fraction of their initial respective concentrations. Bacterial communities analyzed by massive sequencing showed time-dependent changes both in composition and cell numbers. The final remediation stage was characterized by the highest bacterial diversity and evenness. Aside from classical sulfate reducers from the phyla delta-Proteobacteria and Firmicutes, community structure comprised taxa derived from very diverse habitats. The community was also characterized by an elevated proportion of rare phyla and unaffiliated sequences. Numerical ecology analysis confirmed that the temporal population evolution was driven by pH, redox, and K. Results elucidated the community's gradual switch from autotrophic/oxidizing to heterotrophic/reducing living conditions. *Additional information on this project*: http://www.mdpi.com/2075-163X/4/3/578/pdf.

TREATMENT OF URBAN RIVER CONTAMINATED SEDIMENT WITH EX SITU ADVANCED OXIDATION PROCESSES: TECHNICAL FEASIBILITY, ENVIRONMENTAL DISCHARGES AND COST-PERFORMANCE ANALYSIS

Yan, D.Y., T. Liu, and I.N. Lo.
Environmental Technology, Vol 36 Nos 13-16, 2060-2068, 2015

The feasibility of treating urban river contaminated sediment with ex situ advanced oxidation processes was evaluated for achieving either an ideal treatment goal (marine disposal) or a cost-performance treatment goal (beneficial reuse as backfill). To achieve the ideal treatment goal, sequential treatments (Fenton's reaction+activated persulfate oxidation) were carried out on river sediments from southern China, while one-step Fenton's reaction was applied to achieve the cost-performance treatment goal. The resulting effluent was treated and discharged, and sludge generated in wastewater treatment was characterized. After the treatment designed for achieving the ideal goal, most contaminants met the treatment goal except for Pb, Cd, Hg, and Ag, which were present mainly in stable fractions of the sediment. The cost-performance treatment goal was achieved in view of low pollutant contents in the leachate of treated sediment. The cost for achieving the cost-performance treatment goal was much less than that for achieving the ideal treatment goal, primarily owing to the cost of treatment chemicals. Stringent sediment treatment goals based on existing standards would require massive chemical use, complex treatment, and hence high cost. A simpler treatment with fewer chemicals is adequate for sediment beneficially reused as backfill and is economically more advantageous than handling sediment for marine disposal.

CHEMICAL STABILIZATION OF CHROMATE IN BLAST FURNACE SLAG MIXED CEMENTITIOUS MATERIALS

Meena, A.H., D.I. Kaplan, B.A. Powell, and Y. Arai.
Chemosphere, Vol 138, 247-252, 2015

Saltstone is a cement waste form that combines slag, fly ash, and Portland cement. Researchers evaluated the stability of redox-sensitive contaminants (e.g., Cr, Tc-99) in saltstone, specifically the effects of slag as a source of reductant on Cr immobilization in aged (total was leached at the top few (2-3) millimeter depth, the release of Cr(VI) was small (

A FIELD-SCALE STUDY OF CADMIUM PHYTOREMEDIATION IN A CONTAMINATED AGRICULTURAL SOIL AT MAE SOT DISTRICT, TAK PROVINCE, THAILAND: (1) DETERMINATION OF CD-HYPERACCUMULATING PLANTS

Khaokaew, S. and G. Landrot.
Chemosphere, Vol 138, 883-887, 2015

The cadmium (Cd) phytoremediation capabilities of *Gynura pseudochina*, *Chromolaena odorata*, *Conyza sumatrensis*, *Crassocephalum crepidioides*, and *Nicotiana tabacum* were determined by conducting in situ experiments in a highly Cd-contaminated agricultural field at Mae Sot District, Thailand. Most of these common plant species previously demonstrated Cd-hyperaccumulation under greenhouse conditions. This study was conducted to determine if any of the plants could perform as effectively under field conditions by removing Cd from the Mae Sot contaminated fields. All the plant species had at least a 95% survival rate on the final harvest day, and all except *C. odorata* could hyperaccumulate the extractable Cd amounts present in the soil, based on their associated bioaccumulation factor, translocation factor, and background vegetation factor. Previous site investigations indicated that Cd present in much of the field soils was mostly available. *Background information on the study site*: https://www.tci-thaijo.org/index.php/aer/article/download/30914/26660.

REMEDIATION AND RECLAMATION OF SOILS HEAVILY CONTAMINATED WITH TOXIC METALS AS A SUBSTRATE FOR GREENING WITH ORNAMENTAL PLANTS AND GRASSES

Jelusic, M. and D. Lestan.
Chemosphere, Vol 138, 1001-1007, 2015

Researchers applied EDTA soil washing technology featuring chelant and process water recovery at pilot scale to soil contaminated with 4,037 mg/kg Pb, 2,527 mg/kg Zn, and 26 mg/kg Cd. A high EDTA dose (120 mmol/kg of soil) removed 70% Pb, 15% Zn, and 58% Cd, and reduced human oral bioaccessibility of Pb below the limit of quantification and that of Zn and Cd 3.4 and 3.2 times, respectively. The contaminated and remediated soils were placed separately into two garden beds (4 x 1 x 0.15 m) equipped with lysimeters and used for cultivation of ornamental plants and grasses. Plants grown on remediated soil demonstrated the same or greater biomass yield and a decreased uptake of Pb, Zn, and Cd by 10, 2.5, and 9.5 times, respectively, compared to plants cultivated on the original soil. Results suggest that EDTA remediation produced soil suitable for greening. *See an early version of this paper on **pages 70-92** in M. Jelusic's Ph.D. thesis at* http://www.digitalna-knjiznica.bf.uni-lj.si/gozdarstvo/dd_jelusic_masa.pdf.

General News

PLANT-METAL INTERACTION: EMERGING REMEDIATION TECHNIQUES

Ahmad, P.
Elsevier, Waltham, MA. ISBN: 978-0-12-803158-2, 652 pp, 2016

This book covers all of the major heavy metals and their effect on soil and plants, as well as the remediation techniques currently

available to help remove them. The text is divided into four main sections: background on heavy metals contamination, approaches to alleviate heavy metal stress, microbial approaches to remove heavy metals, and phytoremediation.

FEDFACTS: INFORMATION ABOUT THE FEDERAL ELECTRONIC DOCKET FACILITIES

U.S. EPA, Federal Facilities Restoration and Reuse Office, 2015

The public now can view Federal Agency Hazardous Waste Compliance Docket site information by visiting the FEDFacts webpage. At the Federal Facility Cleanup Dialogue meetings in 2010 and 2011, stakeholders called for greater transparency in federal facility cleanup information and emphasized the importance of making the information more accessible and useful. FEDFacts allows the public to access up-to-date information on docket sites from publicly available EPA databases. An interactive map enables users to search by street address, city, county, or other geographies to locate EPA Federal Facility Docket sites in communities across the country.
http://www.epa.gov/fedfac/fedfacts-information-about-federal-electronic-docket-facilities

PROCEEDINGS OF THE 3rd INTERNATIONAL CONFERENCE ON SUSTAINABLE REMEDIATION, FERRARA, ITALY, 17-19 SEPTEMBER 2014

The Sustainable Remediation Conference 2014 aimed to stimulate international exchange by providing a venue for professionals and interested parties from multiple backgrounds to share experiences and perspectives on how contaminated sites can be remediated with a lower environmental footprint, and how site reuse can contribute to more sustainable land development. Topics included (1) new developments since 2012 in visioning and experiences on policy incentives and regulatory support; (2) tools, metrics, and indicators for characterization and analysis to better understand "green," "eco-efficient," or "sustainable" and socioeconomic aspects; (3) "greening" remediation by reducing the environmental footprint and increasing cost-effectiveness, technology demonstration, renewables, and combined benefit approaches; (4) case studies of combined benefit approaches and brownfield redevelopment; and (5) stakeholder involvement and participative approaches. The program, special session summaries, abstracts, slide presentations, and posters are available at http://www.sustrem2014.com/final_conference_documentation.html.

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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