Technology Innovation News Survey

Entries for December 16-31, 2015

Market/Commercialization Information

2016 BROAD AGENCY ANNOUNCEMENT: USACE ERDC
U.S. Army Corps of Engineers (USACE), Vicksburg, Mississippi.
Federal Business Opportunities, FBO-5082, Solicitation W912HZ-16-BAA-01.

The latest Broad Agency Announcement (BAA) issued by the U.S. Army Engineer Research and Development Center (ERDC) describes the current R&D topics of interest for the seven ERDC laboratories, among them the Coastal and Hydraulics Lab (CHL) and the Environmental Lab (EL) in Vicksburg, Mississippi. CHL has foremost capabilities in coastal environmental engineering issues, including sediment transport; dredging and dredged material disposal; physical processes associated with environmental analyses; and groundwater modeling. EL conducts R&D in general areas of environmental restoration (cleanup), such as environmental sensing development, hazardous waste site characterization and treatment, sediment geochemistry and biological effects, water quality modeling, and unexploded ordnance. The BAA is open until superseded, and proposals will be accepted at any time. https://www.fbo.gov/spg/USA/COE/329/W912HZ-16-BAA-01/listing.html

IDIQ REMEDIAL ACTION CONTRACT (RAC): CALLAHAN MINE SUPERFUND SITE, BROOKSVILLE, MAINE AND OTHER PROJECT SITES WITHIN MAINE
U.S. Army Corps of Engineers, USACE District, New England, Concord, MA.
Federal Business Opportunities, FBO-5085, Solicitation W912WJ-16-X-0015.

The U.S. Army Corps of Engineers New England District is issuing this sources sought to determine interest, availability, and capability of small businesses, including but not limited to 8(a), HUBZone, and service-disabled veteran-owned firms (NAICS code 562910), for an IDIQ RAC with a total capacity of $45M. Work may begin in fall 2016 and will extend over a 5-year period. The former Callahan Mine was a hard-rock, open-pit mine (copper, lead, and zinc) developed in Goose Pond, a shallow tidal estuary of about 75 acres. See the FedBizOpps notice for the detailed list of remediation requirements. Capability packages are due by 3:00 PM ET on February 22, 2016.
https://www.fbo.gov/spg/USA/COE/DACA33/W912WJ-16-X-0015/listing.html

IDIQ RAC: ELIZABETH MINE SUPERFUND SITE, SOUTH STRAFFORD, VERMONT AND OTHER PROJECT SITES WITHIN NEW HAMPSHIRE AND VERMONT
U.S. Army Corps of Engineers, USACE District, New England, Concord, MA.
Federal Business Opportunities, FBO-5085, Solicitation W912WJ-16-X-0014.

The U.S. Army Corps of Engineers New England District is issuing this sources sought to determine interest, availability, and capability of small businesses, including but not limited to 8(a), HUBZone, and service-disabled veteran-owned firms (NAICS code 562910), for an IDIQ Remedial Action Contract (RAC) with a capacity of $25M. Work may begin in fall 2016 and will extend over a 5-year period. The site is an abandoned copper mine located on privately owned land in the towns of Strafford and Thetford, Orange County, in east-central Vermont. A non-time-critical removal action was performed to consolidate and cap the tailing piles. Next steps at the site include consolidation and capping of mining materials, construction of a passive treatment system to replace the present water treatment plant, and an extensive list of other work. Capability packages are due by 3:00 PM ET on February 22, 2016.
https://www.fbo.gov/spg/USA/COE/DACA33/W912WJ-16-X-0014/listing.html

LIBRARY OF ACCEPTED TECHNOLOGIES
Florida Department of Environmental Protection (DEP) website, 2015

To facilitate the adoption of effective technologies for pollutant source control and remediation, the Florida DEP follows a standardized process through which consultants and vendors can request agency review of a commercially available environmental technology or strategy. Proposals receiving a favorable review are included in a library of accepted technologies that is posted on the Department's website for ready reference by DEP staff, such as RPMs. The presence of the vendor's information in the library indicates simply that agency experts believe a proposed technology has the potential to be effective in a specific application; it does not imply commercial endorsement or recommendation for use. In 2015 the Florida DEP added descriptions of seven products to its library of innovative technologies potentially applicable for cleaning up groundwater or surface water affected by solvents or petroleum compounds:

- Nutrisulfate® High Sulfate Metabolic Supplement.
- Solar Photocatalytic Treatment of Groundwater.
- MetaFix Reagents for Treatment of Priority Heavy Metals in Soil, Sediment, and Groundwater.
- FOCIS and Vertebrae.
- PlumeStop Colloidal BioMatrix.
- Coco Absorb Petroleum Remediation Product.
- Ferox Iron Powders: ZVI.

https://fldeploc.dep.state.fl.us/tech_portal/accept_list.asp?prog_choice=DWM&cat_choice=all

Cleanup News

IMPLEMENTING IN-SITU CHEMICAL OXIDATION ON AN INDUSTRIAL EX-RATED SITE
Lookman, R., E. van de Ven, A. Lobs, and T. De Bouw.
Proceedings: AquaConSoil 2015, 9-12 June, Copenhagen, Denmark. Paper and 16 slides, 2015

An in situ chemical oxidation (ISCO) remediation project is underway at the VOPAK Terminal ACS site in Antwerp, Belgium, to restore groundwater affected by organic solvents (chlorinated aliphatic hydrocarbons, BTEX, and volatile petroleum hydrocarbons). Part of the accessible heavily contaminated soil was removed by excavation, but the presence of infrastructure prevents further excavation, and the remaining pollution mass must be treated in situ. For this ISCO approach, both air/ozone and hydrogen peroxide are injected into the soil. Soil vapor extraction is implemented alongside ISCO to limit uncontrolled migration of contaminated vapors and ozone. The chemical facility will remain operational during remediation.
Project website: http://www.vopak-expern3.be/.
Paper: http://www.vopak-expern3.be/upload/files/20150424_abstract_Aquaconsoil.pdf.
Slides: http://www.vopak-expern3.be/upload/files/20150527_Slides_Aquaconsoil.pdf

GROUNDWATER REMEDIATION STARTUP REPORT, SITE MONITORING & PERFORMANCE EVALUATION REPORT, REVISION 1.0: CHEMICAL INJECTIONS & ATTENUATION MONITORING, 2ND & KIRBY SITE, HUTCHINSON, KANSAS
Kansas Department of Health & Environment (KDHE), Topeka. 235 pp, 2015

A truck transportation facility has been operated at the 2nd & Kirby intersection since the 1950s. Dissolved-phase TCE and related contaminants have been found in the site groundwater. The site contractor used direct-push injections to introduce emulsified vegetable oil (EVO) to provide the electron donor needed to produce the reducing and anaerobic conditions that stimulate contaminant biodegradation. A total of ~9,000 gal of EVO-water solution (900 gal EVO product, specifically SRS®-FRL) was injected throughout the course of the project. The presence of cDCE as a degradation product of TCE indicates some degree of ongoing reductive dechlorination. This report details the specific measures applied to accelerate the chemical and biological degradation of TCE in the site groundwater.
http://kensas.kdhe.state.ks.us/beris/getDocument.kdhe_ber;jsessionid=ac101c3930d8388db7a760fe46de81e5bc29082104ff.e34MahaTa3eTc40TbhuRch8Oahn0n6jAmljGr5XDqLvpAe2documentId=20000000F6_0VC30K9NT3L5

THE EFFECT OF NAPL STRINGERS ON THE ISCO REMEDY AT THE BRUNSWICK WOOD SITE
Mott-Smith, E., E. Hicks, R. Evans, B. Farrier, C. Butler, and M. Hudson.
Eighth Symposium on Design and Construction Issues at Hazardous Waste Sites, 15-17 April 2015, Philadelphia, Pennsylvania. 27 slides, 2015

Operations at the Brunswick Wood Preserving Superfund site in Brunswick, Georgia, left thin stringers of creosote DNAPL and dissolved- and adsorbed-phase constituents in the subsurface, mainly PAHs such as naphthalene and PCP. The contamination is contiguous with a major gas main, high-voltage overhead electric lines, a railroad line, and a tidal creek. The ROD opted for in situ chemical oxidation (ISCO) and enhanced in situ bioremediation for COCs past the slurry wall. The ISCO system included an 80 lb/d ozone unit, H_2O_2 injection system, and a network of 74 injection wells covering target aquifer zones ranging between 10 to 55 ft bgs. ISCO was implemented from July 2011 to December 2013. Although the system reduced the adsorbed and dissolved-phase PAHs and PCP, three areas containing NAPL stringers did not progress well. Further investigation showed that considerably more DNAPL was present in the formation, principally as extended stringers, than was previously determined. Areas of suspected DNAPL stringers coincided with COC persistence. Continued operation of the ISCO system was considered too costly under the revised NAPL estimate, and the system was stopped in 2013 to focus resources on further NAPL investigation using TarGOST. The impact of creosote DNAPL stringers on the remedy effectiveness is presented along with lessons learned and a path forward for site restoration.
http://secure.sameposts.org/files/933

BLENDED REMEDIATION AT NEW O FIELD USING SUSTAINABLE IN SITU REMEDIATION TECHNOLOGIES, ABERDEEN PROVING GROUND, MD
Caprio, P. and M. Ciarlo.
Eighth Symposium on Design and Construction Issues at Hazardous Waste Sites, 15-17 April 2015, Philadelphia, Pennsylvania. 16 slides, 2015

The New O-Field at Aberdeen Proving Ground is an NPL site consisting of landfilled industrial waste with associated groundwater contamination that discharges into a tidal pond. Contaminants include metals and chlorinated solvents in all media and white phosphorous in pond sediment. The phased performance-based remedy specifies a permeable landfill cap, groundwater biobarriers, an engineered wetland buffer, and a bio-beneficial contaminated sediment cover. This blended remedy was selected to preserve and improve the habitat, which includes a bald eagle nesting area. Biobarrier substrate injections facilitate enhanced reductive dechlorination of chlorinated solvents and reduction of metals. The wetlands and sediment cap, both amended with an organic carbon source, serve as a sustained groundwater treatment mechanism that eventually will become the primary treatment. The holistic remedy uses a combination of natural systems to treat multiple contaminants in groundwater and surface water, and prevent ecological receptor exposure to contaminated sediment. The remedy also employs an unconventional remedial solution for landfill waste by allowing natural flushing processes to promote decay of potential buried chemical warfare agents.http://secure.sameposts.org/files/930

Demonstrations / Feasibility Studies

IN-SITU ZINC BIOPRECIPITATION THROUGH ORGANIC SUBSTRATE INJECTION IN A HIGHFLOW AQUIFER: FROM LABORATORY TO FULL-SCALE
Verbeeck, M., B. Lambie, J. Gemoets, and R. Lookman.
Proceedings: AquaConSoil 2015, 9-12 June, Copenhagen, Denmark. 218-223, 2015

Remediation via in situ metal bioprecipitation in a double long-term field pilot test was evaluated in a high-flow zinc-contaminated aquifer at a galvanizing company in Maasmechelen, Belgium. In lab microcosm tests, >99% of dissolved-phase zinc was removed from the water after addition of an organic substrate—sodium lactate, glycerol, or a commercial emulsified vegetable oil—and sulfate. The three different organic substrates proved equally effective. A 4-week anaerobic leaching test indicated that the formed zinc precipitates are stable. In addition, substrate addition seemed to result in a higher leachability of arsenic and manganese. During the 232-day test period, the field pilots showed a dissolved zinc concentration decrease of 2 to 3 orders of magnitude, with no indication of arsenic mobilization, although concentrations of dissolved manganese increased significantly. Only a limited rebound of zinc concentrations was detected 2.5 years after the last substrate addition. *See **PDF pages 218-223** in the AquaConSoil proceedings volume at* http://www.aquaconsoil.org/assets/aquaconsoil_proceedings_2015.pdf *as well as an earlier paper about this project at* http://www.santerra.be/Resources/Article%20Elsevier%20apr%202013%20in%20press-2.pdf.

IN SITU WETLAND RESTORATION DEMONSTRATION: ESTCP COST AND PERFORMANCE REPORT
Ruiz, N., J. Bleiler, K. Gardner, M. Johnson, T. Estes, D. Anders, and D. Barclift.
ESTCP Project ER-200825, 55 pp, 2014

Specific objectives of the demonstration performed at Aberdeen Proving Ground, Maryland, were to evaluate the ability of activated carbon (AC) to reduce PCB bioavailability and associated risks in Canal Creek wetland habitats using a variety of AC delivery systems; provide cost and performance data; obtain regulatory agency and trustee acceptance; and disseminate lessons learned. Sequestration agents were mechanically deployed over the surface of a wetland and allowed to integrate into the surface layer of the hydric soil through natural mixing processes (e.g., bioturbation, tidal cycles, root mixing). The technologies deployed comprised a powder-activated carbon (PAC) slurry (the Slurry Spray), two pelletized AC products (AquaBlok® and SediMite™), and an engineered manufactured soil cover system (the Sand control). The goal was risk reduction, not mass removal; hence, performance was gauged through post-treatment evaluation of reduction in PCB bioavailability. While the findings of the overall program suggest that AC addition can sequester PCBs, the field demonstration findings were not conclusive in demonstrating effective reductions in bioavailability. *See this report and the project summary presentation at the bottom of*https://www.estcp.com/Program-Areas/Environmental-Restoration/Contaminated-Sediments/ER-200825.

Research

METHODS FOR MINIMIZATION AND MANAGEMENT OF VARIABILITY IN LONG-TERM GROUNDWATER MONITORING RESULTS
Kulkarni, P., C. Newell, C. Krebs, T. McHugh, and B. Sanford.
ESTCP Project ER-201209, 180 pp, 2015

To determine the effect of sample collection method on monitoring variability, five sample collection methods were evaluated in the field: (1) low-flow with purge to parameter stability (low-flow standard); (2) low-flow with fixed small-volume (3 L) purge; (3) low-flow with fixed large-volume (18 L) purge; (4) active no-purge (HydraSleeve); and (5) passive no-purge (SNAP samplers). For the dataset as a whole, the five sample methods yielded relatively small differences in VOC concentration (< ± 20%). Overall results suggest that for most monitoring well sampling methods tested, data quality is independent of method. In that context, ease of implementation, cost, and sample volume requirements may be the deciding factors in sample method selection. *See this report and additional reports, tools, and guides at the bottom of*https://www.estcp.com/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Monitoring/ER-201209.

ASSESSING MERCURY AND METHYLMERCURY BIOAVAILABILITY IN SEDIMENT PORE WATER USING MERCURY-SPECIFIC HYDROGELS
Magar, V., N. Steenhaut, L. Brown, A. Amirbahman, D. Massey, J. Biedenbach, and G. Lotufo.
SERDP Project ER-1771, 110 pp, 2015

Mercury-specific diffusive gradients in thin film (DGT) devices were developed to measure labile total (THg) and methylmercury (MeHg) in sediments. A variety of benthic organisms were codeployed with DGT devices in a variety of sediment conditions in a series of lab experiments and at a marine field site. Investigators analyzed the uptake patterns of THg and MeHg in both tissue samples and DGT samples to look for data correlation. Overall, it appears that relationships between DGT and tissue data are highly variable and may depend on the sediment characteristics at individual locations. Neither DGT nor tissue samples were consistently more sensitive than the other to THg or MeHg concentrations in contaminated sediments. https://www.estcp.com/content/download/37459/356961/file/ER-1771-ER.pdf.

COUPLED DIFFUSION AND REACTION PROCESSES IN ROCK MATRICES: IMPACT ON DILUTE GROUNDWATER PLUMES
Schaefer, C., R. Towne, D. Lippincott, and H. Dong.
SERDP Project ER-1685, 116 pp, 2015

The overall goal of this research was to measure and evaluate the impacts of bedrock structure and mineralogy on the persistence and diffusive flux of TCE from rock matrices to groundwater, and to verify that abiotic dechlorination reactions capable of significantly reducing monitored natural attenuation time frames actually occur in the field within bedrock matrices. Rates of abiotic chlorinated ethene degradation due to reaction with naturally occurring ferrous minerals within the rock matrices were compared to the rate of diffusive flux through the rock matrix. The investigators subsequently assessed the impact of this degradation on attenuation time frames. Results suggest that, at least for some bedrock sites where ferrous iron minerals are present within the rock matrices, abiotic reaction in rock matrices might serve as an important mechanism for mitigating the adverse impacts of matrix back-diffusion on plume intensity and longevity.
https://www.estcp.com/content/download/37362/356277/file/ER-1685-ER.pdf

FEASIBILITY OF AN INTEGRATION OF AN ELECTRODIALYTIC PROCESS INTO SOIL REMEDIATION PROCEDURE FOR REMOVAL OF COPPER, CHROMIUM AND ARSENICv
Kowalski, K.P., S.S. Nielsen, P.E. Jensen, T.H. Larsen, M. Terkelsen, and C. Bagge.
Contaminated Sites Bratislava, 27-29 May 2015, Slovak Republic. 118-124, 2015

With minimal risk posed to nearby recipients and area groundwater resources, the Collstrop site in Denmark is used as a standard research site for wood preservation issues (e.g., contamination by chromated copper arsenate, or CCA) and remediation methods. A pilot study of the feasibility of implementing a combined soil washing and electrodialytic (ED) process for treatment of CCA contaminated soil is underway at the Collstrop site to evaluate the ED process and define challenges it may face at full scale. Soil washing can be used to separate the most contaminated soil fraction (i.e., the finest fraction) and thus reduce the amount of material for ED treatment. Lab studies showed that it is possible to apply ED remediation for separation of As, Cr, and Cu from soil materials. Factors influencing ED at pilot scale include the pH of the treated suspension, the stirring routine to maintain material suspension, and membrane fouling. The pilot study is ongoing to define the process parameters, optimum equipment, and process design.
Paper: http://orbit.dtu.dk/files/112268031/Kowalski_ContSites_paper_release__1.pdf
Slides: http://contaminated-sites.sazp.sk/sites/contaminated-sites.sazp.sk/files/prilohy/21_ICCS_2015_Krzysztof_Kowalski.pdf

PHYTOSTABILISATION DEVELOPMENT ON METAL-CONTAMINATED SOILS TO PRODUCE ENERGY: ECOLOGICAL VIABILITY, SOCIAL ADVANTAGES AND ECONOMIC ASSESSMENT
Douay, F. and G. Bidar.
ADEME (French Environment and Energy Management Agency), 32 pp, 2015

Metaleurop Nord, located at Noyelles-Godault in Northern France, was a major European smelter of zinc and lead for almost a century until its closure in 2003. In this area, mean concentrations of Cd, Pb, and Zn in plowed layers are 20-50 times higher than regional background values. The PHYTENER project aims to assess phytostabilization in combination with energy crop production (wood and *Miscanthus* crops) for this site, with evaluation of the impacts of the crops on soils and the environment, social perceptions, and economic outcomes. In spring 2007, researchers established three ~1-hectare *Miscanthus giganteus* fields on former agricultural lands presenting a contamination gradient. Results of topsoil and plant sampling conducted in 2011 show that *M. giganteus* grows well on highly contaminated soils. This species accumulates metals mainly in roots and strongly limits contaminant transfer to aboveground parts. Though the soils present a clear contamination gradient, no significant difference was observed in metal concentrations in stems and leaves from the three fields. http://www.ademe.fr/sites/default/files/assets/documents/phytener-synthese-anglais-201507.pdf

GEOPHYSICAL CHARACTERIZATION OF AN UNDRAINED DYKE CONTAINING AN OIL-SANDS TAILINGS POND, ALBERTA, CANADA
Booterbaugh, A.P., L.R. Bentley, and C.A. Mendoza.
Journal of Environmental & Engineering Geophysics, Vol 20 No 4, 303-317, 2015

Geophysical characterization of an undrained oil sands tailings pond dyke was conducted at Syncrude Canada's Southwest Sand Storage Facility. Push-tool conductivity, electromagnetic, and electrical resistivity tomography (ERT) methods in tandem with hydrogeological and chemistry measurements were used to investigate soil moisture, hydraulic heads, and groundwater salinity distributions. Geophysical data collected from 2001 to 2008 and interpretations thereof were used to validate studies of groundwater flow and salt transport within the structure. A relatively strong relationship was found between bulk electrical conductivity and soil moisture, while weak to no correlation was observed between bulk and fluid electrical conductivity. ERT surveying was capable of clearly identifying the location of the capillary fringe within the dykeSee *details of this study in A.P. Booterbaugh's Master's thesis at* http://theses.ucalgary.ca/bitstream/11023/1788/2/ucalgary_2014_booterbaugh_aaron.pdf.

SPATIAL VARIATION OF SHEAR WAVE VELOCITY OF WASTE MATERIALS FROM SURFACE WAVE MEASUREMENTS
Greenwood, W., D. Zekkos, and A. Sahadewa.
Journal of Environmental & Engineering Geophysics, Vol 20 No 4, 287-301, 2015

The mechanical properties of waste materials typically are believed to be more variable than natural soils. Measurement and analysis of five different waste types was conducted at 26 locations via shear wave velocity measurements performed using multichannel analysis of surface waves and microtremor analysis techniques. The test materials were municipal solid waste (MSW) in Subtitle D landfills; MSW in a bioreactor landfill; MSW incineration ash; hazardous waste and construction and demolition waste; and municipal water treatment sludge. Statistical analyses were performed for these materials as well as those available in the literature. The coefficient of variation of the shear wave velocity of these waste types was found to be similar to values reported in the literature for soil and rock sites.

MOTILE *GEOBACTER* DECHLORINATORS MIGRATE INTO A MODEL SOURCE ZONE OF TRICHLOROETHENE DENSE NON-AQUEOUS PHASE LIQUID: EXPERIMENTAL EVALUATION AND MODELING
Philips, J., A. Miroshnikov, P.J. Haest, D. Springael, and E. Smolders.
Journal of Contaminant Hydrology, Vol 170, 28-38, 2014

This study characterized the motility of the *Geobacter* dechlorinators in a TCE-to-cDCE dechlorinating KB-1™ subculture. Using an agarose in-plug bridge method, no chemotaxis toward or away from TCE was found. A second experiment—an inoculated aqueous layer placed atop a sterile sand layer—showed that *Geobacter* migrated several centimeters in the sand layer in just seven days. A third experiment used a diffusion-cell setup with a 5.5-cm central sand layer separating a DNAPL from an aqueous top layer as a model source zone to examine the effect of random motility on TCE DNAPL dissolution. With top layer inoculation, *Geobacter* quickly colonized the sand layer. After 19 days, the DNAPL dissolution enhancement was only 24% lower than with a homogenous inoculation of the sand layer. A diffusion-motility model developed to describe dechlorination and migration in the diffusion cells suggested that the fast colonization of the sand layer by *Geobacter* was due to the combination of random motility and growth on TCE. *Manuscript version:* http://arxiv.org/pdf/1409.8577

MICROBIAL CHARACTERIZATION OF SOIL USING MOLECULAR METHODS AND TRADITIONAL CULTURING FOR ASSESSMENT OF NATURAL ATTENUATION OF MIXED CONTAMINANTS
Croyle, K.W., Y.M. Nelson, A. Hamrick, et al.
Third International Symposium on Bioremediation and Sustainable Remediation Technologies, 18-21 May 2015, Miami, Florida. Abstract only, 2015

At the Santa Susana Field Laboratory (SSFL), historic liquid-propulsion rocket engine tests and nuclear energy research left PCBs, dioxins, PAHs, and petroleum hydrocarbons (PHCs) in the soil. Samples from 30 SSFL locations were collected to assess contaminant biodegradation potential in soil using traditional culturing techniques combined with sequencing of the 16S or ITS regions of the cultured bacteria and fungi in addition to molecular methods, such as terminal restriction fragment length polymorphism (TRFLP). From the culturing experiments, 45 microorganisms were isolated, sequenced, and identified, of which 10 bacterial species and 5 fungal species were reported biodegraders of some of the site contaminants. According to TRFLP analysis, soil type exerted more effect on the microbial community structure than the presence of any contaminant. Results suggest that microbes present in SSFL soils are capable collectively of biodegrading PHCs, but not PAHs, PCBs, or dioxins, which is consistent with companion microcosm experiments incubated in the laboratory. *For details, see K.W. Croyle's thesis at* http://digitalcommons.calpoly.edu/theses/1288/

ASSESSMENT OF HEXAVALENT CHROMIUM NATURAL ATTENUATION FOR THE HANFORD SITE 100 AREA
Truex, M.J., J.E. Szecsody, N.P. Qafoku, R. Sahajpal, L. Zhong, A.R. Lawter, and B.D. Lee.
PNNL-24705, 56 pp, 2015

Remediation efforts for hexavalent chromium plumes in the 100 Area at the Hanford site are underway to restore the groundwater to meet the drinking-water standard (48 µg/L) and protect the Columbia River by ensuring that discharge of groundwater to the river is below the surface-water quality standard (10 µg/L). Current remedies include pump and treat at the 100-D, 100-H, and 100-K areas and monitored natural attenuation at the 100-F/IU Area. Remedy selection is still underway in other 100 Area sites. This paper describes studies conducted to demonstrate and quantify Cr(VI) natural attenuation mechanisms using 100 Area sediments and groundwater conditions. http://www.osti.gov/scitech/biblio/1224514

DREXEL MATERIALS SCIENTISTS AID AUSTRALIAN INSTITUTION IN DEVELOPING SUPER-ABSORBENT MATERIAL THAT CAN SOAK UP OIL SPILLS
Drexel Now: Science & Technology, 30 Nov 2015

Materials scientists from Drexel University (Penn. USA) and Deakin University (Australia) teamed up to manufacture and test a new material—a boron nitride nanosheet—that can absorb up to 33 times its weight in oils and organic solvents. The material, which literally absorbs the oil like a sponge, is the result of support from the Australian Research Council and is now ready to be tested by industry after two years of refinement. The nanosheet is made up of flakes that are just several nanometers in thickness with tiny holes. This form effectively increases the nanosheet's surface area per gram to the size of five and a half tennis courts, thus allowing each nanosheet to absorb oils and organic solvents up to 33 times its own weight. The material initially was simply a powder with tremendous absorption capabilities, but that form was not easily used on spills. The boron nitride nanosheets are flame resistant, which expands their potential use to applications in electrical and heat insulation. http://drexel.edu/now/archive/2015/November/oil-spill-material/

AMYLOID-CARBON HYBRID MEMBRANES FOR UNIVERSAL WATER PURIFICATION
Bolisetty, S. and R. Mezzenga.
Nature Nanotechnology, [advance online publication prior to print] 2016

A newly designed membrane made up of activated charcoal and tough, rigid whey protein fibers (denatured to form amyloid fibrils) can pull heavy metals and radioactive wastes out of water. The membranes can capture more than their own weight in some contaminants and filter >99% of toxic materials out of severely polluted solutions. In tests, the amyloids trapped lead, mercury, gold, and radioactive waste particles. The membrane design is simple and flexible and could be adjusted to optimize cleanup or metal recovery for use in small- or large-scale water purification units. The membranes will be tested and optimized in a variety of real contaminated waters to evaluate the effects of chemical complications, such as high or low acidity. *Additional news*: https://www.ethz.ch/en/news-and-events/eth-news/news/2016/01/highly-efficient-heavy-metal-ions-filter.html

DEVELOPING MANUFACTURED SOILS FOR SUCCESSIONAL REVEGETATION OF MINED LANDS OF THE BOREAL SHIELD
Watkinson, A., A. Lock, S. Hayes, P. Beckett, and G. Spiers.
The 6th Mining and Environment International Conference, Laurentian University, Sudbury, Ontario, Canada, 20-25 June 2015: Conference Abstracts, Vol 2, 2015

Boreal soils are naturally shallow, hence the amount of material available locally or stripped from the mine site for later use often is inadequate for site reclamation. In research supported by Barrick-Hemlo (Hemlo, ON) for manufacturing a soil from locally sourced, organic-rich residual materials suitable for use in site reclamation as growth media for boreal vegetation, multiple Technosols were manufactured from blends of mill-derived organic residuals and finely crushed mine rock. In a 10-week growth study using annual rye grass, blends of at least 50% woody residuals and a mixture of finely crushed mine rock produced a viable growth medium. On industrial brownfields, two Technosols were constructed with 40% and 80% organics, respectively, using woody residuals and mixed mine rock. The materials were applied to 30 or 60 cm depths over a coarse mine rock pile to simulate vegetation islands. Soil pore-water samples and soil microclimate data collected over two annual cycles demonstrated that increasing the soil organic matter increased soil moisture and concentration of bioavailable plant nutrients, while increasing the soil depth enabled the development of a reservoir of available plant moisture.

General News

PERFLUORINATED COMPOUNDS INTERIM GUIDANCE
Naval Facilities Engineering Command, 19 pp, 2015

Certain perfluorinated compounds (PFCs) have been identified as emerging contaminants relevant to the Defense Environmental Restoration Program. The objective of this brief guide is to assist Navy RPMs with programmatic and technical issues related to PFCs at Navy Environmental Restoration sites. The issues include funding responsibilities, risk assessment, and regulatory requirements. General guidance is presented in the form of responses to FAQs (frequently asked questions). RPMs are encouraged to discuss site-specific conditions with the respective ER Manager or Base Closure Manager to determine if circumstances allow for Environmental Restoration (ER), Navy (ER, N), or Base Realignment and Closure eligibilityhttps://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gnr/don-ey-guid-pfc-faq-20150129i.pdf

EIGHTH SYMPOSIUM ON DESIGN AND CONSTRUCTION ISSUES AT HAZARDOUS WASTE SITES
Society of American Military Engineers (SAME), Philadelphia Post, 2015

The SAME Philadelphia Post hosted 320 attendees at the 8th DCHWS symposium on April 15-17, 2015, in downtown Philadelphia. The meeting formerly was sponsored by USEPA and USACE. The Philadelphia Post undertook the effort to reactivate this event as the primary sponsor, with EPA as cosponsor. The goal was to facilitate interactive engagement between attendees (40% from government and 60% from the private sector) related to issues affecting the environmental cleanup field, which continues to evolve rapidly. The meeting's slide presentations and posters are available at http://secure.sameposts.org/franchises/philadelphia/blogs/philadelphia-post-dchws-a-success

BALANCE 4P: BALANCING DECISIONS FOR URBAN BROWNFIELD REGENERATION: PEOPLE, PLANET, PROFIT AND PROCESSES
Maring, L., S. van der Meulen, F. Hooimeijer, et al.
SoilPedia, 143 pp, 2015

The overall aim of the Balance 4P project is to develop a holistic approach that supports brownfield redevelopment by integrating technical, economic, and social aspects, and also to provide means for clearly communicating challenges and opportunities relevant to site-specific subsurface qualities. The holistic approach has been developed with case studies as governed by law, regulation, policy, and institutions that set the planning conditions for urban cleanup and (re)development. The focus of Balance 4P has been an investigation of tools that can enhance knowledge exchange between sectors. In the case studies (Rotterdam harbor in the Netherlands, Alvat in Buggenhout in Belgium, and Fixfabriken in Goeteborg, Sweden) different tools have been applied, and the experiences are summarized for each case. Balance 4P shows how to integrate sustainable instruments into the redevelopment process.
http://soilpedia.nl/Bijkiwiki%20documenten/Spowmap/BALANCE%204P/Balance%204P%20main%20technical%20report%20without%20appendices%2015-01-15.pdf

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

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