Technology Innovation News Survey

Entries for April 16-30, 2018

Market/Commercialization Information

START V: SUPERFUND TECHNICAL ASSESSMENT & RESPONSE TEAM 5
U.S. Environmental Protection Agency, Region IX, San Francisco, CA.
Federal Business Opportunities, FBO-5922, 2018

U.S. EPA's Region 9 Contracting Office intends to issue 2 RFPs for the Superfund Technical Assessment and Response Team (START) V on or about June 18, 2018 (the date is subject to change). These acquisitions will obtain technical support services for EPA Regions 7 and 9, respectively, for emergency response, removal, site assessment, training, data management, and related services. Following full and open competition, the Government intends to award a single fixed-rate IDIQ contract for each region for an anticipated 12-month base period with six 12-month options (total contract length 7 years), NAICS code 541620. The draft statements of work are available only on FedConnect.
Pre-Solicitation notice for No. 68HE0918R0007 for EPA Region 7 (IA, KS, MO, and NE)
FedBizOpps: https://www.fbo.gov/spg/EPA/OAM/RegIX/68HE0918R0007/listing.html
FedConnect: https://www.fedconnect.net/FedConnect/?doc=68HE0918R0007&agency=EPA
Pre-Solicitation notice for No. 68HE0918R0009 for EPA Region 9 (AZ, CA, HI, NV, American Samoa, Guam, and U.S. Trust Territories)
FedBizOpps: https://www.fbo.gov/spg/EPA/OAM/RegIX/68HE0918R0009/listing.html
FedConnect: https://www.fedconnect.net/FedConnect/?doc=68HE0918R0009&agency=EPA

MINE RECLAMATION IDIQ FOR REGION 6 & 10
USDA, Forest Service, R-6 Contracting North - Gifford Pinchot NF, Vancouver, WA.
Federal Business Opportunities, FBO-5926, Solicitation 12046W18R0011, 2018

This acquisition is a total small business set-aside under NAICS code 541330. The scope of the solicitation will cover A/E services for an array of CERCLA response actions at abandoned mine sites located on National Forest System Lands in Regions 6 and 10. These sites are known or suspected to contain mine waste and hazardous materials. The Forest Service intends to award approximately 4 IDIQ contracts. Release of the solicitation documents is anticipated on or around June 6, 2018. https://www.fbo.gov/spg/USDA/FS/05K3/12046W18R0011/listing.html

SBIR E-LEARNING FOR HAZMAT AND EMERGENCY RESPONSE
DHHS, National Institutes of Health, Funding Opportunity RFA-ES-18-006, 2018

This funding opportunity encourages SBIR grant applications from small business concerns that propose to further the development of advanced technology training (ATT) products for training HAZMAT workers; skilled support personnel; emergency responders in biosafety response and disasters; and resiliency response. Proposed ATT tools must complement the goals and objectives of the Worker Training Program as described at http://www.niehs.nih.gov/careers/hazmat/about_wetp/. A letter of intent to apply must be submitted by June 30, 2018. The closing date for applications is July 31, 2018. http://www.grants.gov/web/grants/view-opportunity.html?oppId=304260

Cleanup News

NOVEL IN-SITU ADSORPTIVE METHOD TO ADDRESS VINYL CHLORIDE RISK
Lichti, N. and B. Tunnicliff.
RemTech 2017: Remediation Technologies Symposium. Presentation 45, 44 slides, 2017

The first of two case studies focused on PCE, TCE, and daughter products during the sequential application of edible carbon substrate and ZVI followed by an activated carbon-based amendment. This remediation of chlorinated solvents in a sewer bed involved traditional reductants, some VC generation, a nearby property boundary, and subsequent granular activated carbon (GAC)-based amendments application. The second case study showcased remedial efforts for two separate plumes in groundwater—one primarily c-1,2-DCE (70 ppb) and 1,1,1-TCA (300 ppb) and the other mainly c-1,2-DCE (30 ppb) and VC (10 ppb)—over a large aerial extent that required treatment in a 3-month timeframe to facilitate a real estate transaction. The cleanup was accomplished using injections of Trap & Treat® BOS 100®. Two days of pilot-scale testing were completed to refine the full-scale design. Full-scale injections were completed over 12 working days.
Slides: http://www.esaa.org/wp-content/uploads/2017/10/17-Lichti.pdf
Longer abstract: http://www.esaa.org/wp-content/uploads/2017/09/RemTech2017Abstracts-45.pdf

MONTANA POLE AND TREATING PLANT: MORE CONSIDERATION AND EVALUATION OF ALTERNATIVES
Montana Department of Environmental Quality (DEQ), 133 pp, 2018

The release by U.S. EPA of the *Fourth Five-Year Review Report for the Montana Pole and Treating Plant* in June 2017 and subsequent Montana DEQ public presentations in August and September evoked a comment letter to DEQ. The writer requested that DEQ validate, explain, and communicate to the public why dioxin cannot be "re-treated" and remediated to meet acceptable standards. In response, the DEQ prepared a four-part, in-depth report to illuminate the limitations and challenges found in screening and selecting dioxin remediation technologies used at wood treating sites such as Montana Pole. For the full report, see the **Dioxins Memo Plus Exhibits** at http://deq.mt.gov/Land/fedsuperfund/mtpole.

SUPERFUND PROPOSED PLAN: MATLACK, INC. SUPERFUND SITE, WOOLWICH TOWNSHIP, GLOUCESTER COUNTY, NEW JERSEY
U.S. EPA Region 2, 17 pp, 2017

This proposed plan identifies the preferred alternative to remediate contaminated soil, groundwater, seep water, and sediment associated with the Matlack Inc. Superfund Site. The preferred alternative calls for the installation of permeable reactive barriers to address ethylbenzene, PCE, TCE, VC, and 4-chloroaniline in the groundwater in combination with excavation of contaminated soil and sediment as the final remedy to address site contamination. The remedy also addresses contamination resulting from groundwater seepage that has affected surface water and Grand Sprute Run, as well as seep sediment. *See this plan and other site information at* https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.ars&id=0200307&doc=Y&colid=65198&region=02&type=AR.

Demonstrations / Feasibility Studies

SEDIMENT ELECTROKINETIC REMEDIATION TECHNOLOGY FOR HEAVY METAL POLLUTION REMOVAL
European Commission LIFE + SEKRET Program Website, 2018

As a consequence of heavy industrial activity and maritime transport, the Port of Livorno is listed in Italy as a Polluted Site of National Relevance. Environmental site assessment showed that a thick layer (up to 3 m) of the port seabed is affected by heavy metals, a total volume of sediments of ~218,000 m^3. Contaminants include Cd, Hg, Pb, Cu, Zn, As, and PAHs. The SEKRET (Sediment ElectroKinetic REmediation Technology) demonstration project at the Port of Livorno was conducted from January 2014 to October 2017 to treat 150 m^3 of dredged sediment in a specially equipped confined disposal facility using electrokinetic remediation. The confined disposal facility was designed to allow its conversion into either a port commercial facility or into a recreational area if its reuse was not an option. The project website documents the papers, presentations, and demonstration results prepared to date at http://lifesekret.com/. *See also a listing of other environmental projects on the EU Life Program website at* http://ec.europa.eu/environment/life/.

ENHANCED BIOREMEDIATION OF NUTRIENT-AMENDED, PETROLEUM HYDROCARBON-CONTAMINATED SOILS OVER A COLD-CLIMATE WINTER
Kim, J., A.H. Lee, and W. Chang.
Science of the Total Environment 612:903-913(2018)

A pilot-scale biopile field experiment for nutrient-amended petroleum-contaminated fine-grained soils was performed over the winter at a cold-climate site to determine the rate and extent of hydrocarbon biodegradation and microbial responses associated with natural seasonal freeze-thaw conditions. Treated and untreated biopiles were constructed (~3500 kg each) on an open outdoor surface at a remediation facility in Saskatoon, Canada. The treated biopile received N-P-K-based nutrient and humate amendments before seasonal freezing. Real-time field monitoring indicated significant unfrozen water content in the treated and untreated biopiles throughout the freezing period, mid November to early March. Unfrozen water was slightly more available in the treated biopile due to the aqueous nutrient supply. F3 degradation largely occurred during freezing while F2 hydrocarbons were primarily removed during thawing. Biomarker-based hydrocarbon analyses confirmed enhanced biodegradation in the treated biopile during freezing. The soil treatment increased the first-order rate constants for F2, F3, and TPH degradation by a factor of 2 to 7 compared to the untreated biopile. Shifts in bacterial community appeared in both biopiles as the pile soils froze and thawed.

KW SOIL FLUSHING/INFILTRATION TREATABILITY TEST PLAN
DOE/RL-2017-30, 52 pp, 2018

Cr(VI), a primary contaminant of concern at specific locations directly above the 100-KR-4 Groundwater Operable Unit on the Hanford Site, has affected groundwater in this operable unit as indicated by the presence of persistent plumes in groundwater associated with apparent historical release areas. To facilitate cleanup of this contamination, soil flushing is being evaluated to determine its feasibility as a remedial alternative component of ongoing and future remedial actions. This treatability test plan outlines the technical approach for conducting a soil flushing/infiltration study with the intent of accelerating groundwater cleanup of Cr(VI) at the 100-K West Area pump-and-treat (P&T) system. Within weeks following shutdown of the P&T system during a rebound study conducted between May 2016 and March 2017, Cr(VI) concentrations nearly tripled in several wells in the study area and later peaked at about 180 µg/L in the upper portion of the unconfined aquifer. This plan identifies an area of ~4,645 m² where the soil flushing/infiltration test will be conducted and details the planned test process. Results will be used to evaluate the feasibility of soil flushing/infiltration as a means of removing Cr(VI) mass from the vadose zone and capturing that mass by groundwater extraction. https://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0065970H

THERMALLY ENHANCED IN SITU BIOREMEDIATION OF GROUNDWATER CONTAMINATED WITH CHLORINATED SOLVENTS: A FIELD TEST
Nemecek, J., J. Steinova, T. Pluhar, P. Najmanova, V. Knytl, K. Nesetril, and M. Cernik.
RemTech Europe 2017: European Conference on Remediation Market and Technologies, 20-22 September, Ferrara, Italy. 22 slides, 2017

A thermally enhanced in situ bioremediation technology was tested at a pilot site where the total concentration of chlorinated ethenes (CVOCs) ranged from 249 to 14,539 µg/L. The aquifer at the site is situated in shallow sandy saprolite underlain by irregularly fractured granite. A groundwater circulation system comprising pumping and injection wells was designed using mathematical modeling of heat transfer. Extracted water was heated to 35-45°C with solar and electric heaters and then injected back into the aquifer with the aim of maintaining an aquifer temperature around 20-25°C (the optimal range found in lab tests for reductive dechlorination by the site's indigenous dechlorinating microorganisms). Whey was injected in three batches into the injection well. The test was monitored using hydrochemical and molecular biological tools. Adding substrate and increasing the temperature resulted in a rapid increase in total biomass, sulfate-reducing bacteria, and reductive dechlorinators (especially *Dehalococcoides* sp. and VC reductase genes *vcrA* and *bvcA*), along with a marked increase in CVOC dechlorination. After one month, total CVOC concentration fell by 54-94% in effectively influenced wells. At the same time, chlorine number (average number of chlorine atoms per ethene in the groundwater sample) declined from an initial 1.1-1.6 to 0.1-0.8, indicating the occurrence of significant reductive dechlorination. In a reference well where reductive dechlorination was enhanced with substrate only, the degradation process was much slower.
Slides: http://2017.remtechexpo.com/images/2017_presentazioni/PRESENTAZIONI_REMTECHEUROPE_2017/RemTech%20Europe_Nemecek.pdf

Research

SOIL GAS SAMPLING FOR 1,4-DIOXANE DURING HEATED SOIL VAPOR EXTRACTION
Burris, D.R., P.R. Dahlen, and R.E. Hinchee.
Groundwater Monitoring & Remediation 38(1):85-89(2018)

Soil gas sampling for 1,4-dioxane at elevated soil temperatures, such as those experienced during in situ thermal treatment, has the potential to yield low results due to condensation of water vapor in the ambient temperature sampling vessel and the partitioning of 1,4-dioxane into that condensate. A simple vapor/condensate sampling apparatus was developed to collect both condensate and vapor samples to allow for determination of a reconstituted effective soil gas concentration for 1,4-dioxane. Results using the vapor/condensate sampling apparatus during a heated air injection SVE field demonstration are presented, along with those of a comparable laboratory system. Extraction well effluent sampling at the wellhead by direct vapor canister sampling provided erratic results compared to those of the vapor/condensate apparatus, whereas direct vapor canister sampling of extraction well effluent after the air-water separator provided results reasonably comparable (within 35%) to those using the vapor/condensate apparatus at the wellhead. *This paper is temporarily* ***Free Access*** *at* http://onlinelibrary.wiley.com/doi/10.1111/gwmr.12255/full.

PRE-REMEDY BASELINE CHARACTERIZATION OF THE OTTAWA RIVER USING PHYSICAL, BIOLOGICAL, AND CHEMICAL LINES OF EVIDENCE
Mills, M.A., J.P. Schubauer-Berigan, J.M. Lazorchak, K.M. Fritz, and J.R. Meier.
EPA 600-R-17-355, 5,944 pp, 2017

The Great Lakes National Program Office (GLNPO) selected environmental dredging as the remedy of choice for remediation and cleanup of the Ottawa River (near Toledo, Ohio) where the sediments are contaminated with PCBs, PAHs, and Pb. A Phase 1 baseline assessment of the site was conducted in the summer and fall of 2009 and the spring of 2010 prior to the onset of dredging. In partnership with GLNPO, EPA implemented a comprehensive sustained research program (2009-2015) for the Ottawa River remediation project to evaluate and optimize the assessment and monitoring methods conceived and developed along physical, biological, and chemical lines of evidence that can be used in a weight-of-evidence framework to assess sediment remedies. This report summarizes the site characterization and data collection tasks carried out in Phase 1 prior to the onset of environmental dredging activities. Additional data reports will follow that document the subsequent phases of the Ottawa River project. https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100SUO2.txt

EFFECT OF POLYMER RATIO ON NZVI LOADING ONTO ELECTROSPUN NANOFIBER MAT FOR MITIGATING GROUNDWATER CONTAMINANTS
Ren, J., H.K. Shon, and L.D. Tijing.
TechConnect Briefs: Materials for Energy, Efficiency and Sustainability 2:265-268(2017)

Although nanoscale zero-valent iron (NZVI) has been widely used for the reduction of halogenated organics and heavy metals in the groundwater, individual NZVI particles are mobile and prone to aggregate, thereby reducing the reaction sites exposed to contaminants. The high specific area and size-controllable and material-compatible properties of the electrospun polymer nanofiber mat provides a means to immobilize and distribute NZVI particles. When NZVI particles were immobilized onto polyacrylic acid-polyvinyl alcohol (PAA-PVA) electrospun nanofiber mats with different PAA/PVA ratios, results indicated that a PAA/PVA ratio of 3:1 immobilized the most NZVI particles (more than 48 wt% immobilized on the mat) and had the highest removals of methylene blue at 94% and Cu(II) ions at 84%. The high uptake was attributed to the higher porosity of the mat as well as to an increased number of free carboxylic groups available on the cross-linked nanofibers.
https://briefs.techconnect.org/papers/effect-of-polymer-ratio-on-nzvi-loading-onto-electrospun-nanofiber-mat-for-mitigating-groundwater-contaminants/

COMPARISON OF SOIL SAMPLING AND ANALYTICAL METHODS FOR ASBESTOS AT THE SUMAS MOUNTAIN ASBESTOS SITE: WORKING TOWARDS A TOOLBOX FOR BETTER ASSESSMENT
Wroble, J., T. Frederick, A. Frame, and D. Vallero.
PLoS ONE 12(7):e0180210(2017)

Asbestos occurs naturally at the Sumas Mountain site. Landslides there annually deposit asbestos-containing rubble into the Swift Creek and Sumas River. A study was conducted there to compare three soil analytical methods and two soil sampling methods to determine which method or combination of methods would yield more reliable soil asbestos data than other methods. Samples were collected using both traditional discrete (grab) samples and incremental sampling methodology (ISM). Analyses were conducted using polarized light microscopy, transmission electron microscopy (TEM) methods, or a combination of the two. Data showed that the fluidized bed asbestos segregator followed by TEM analysis could detect asbestos at locations that were not detected using other analytical methods; however, this method exhibited high relative standard deviations, indicating the results might be more variable than other soil asbestos methods. Analytical results for metals showed that measured concentrations in ISM samples were less variable than in discrete samples.
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0180210

MECHANISMS OF METHYL MERCURY NET DEGRADATION IN ALDER SWAMPS: THE ROLE OF METHANOGENS AND ABIOTIC PROCESSES
Kronberg, R.M., J.K. Schaefer, E. Bjoern, and U. Skyllberg.
Environmental Science & Technology Letters 5(4):220-225(2018)

Wetlands are common net producers of the neurotoxin monomethylmercury (MeHg) and are largely responsible for MeHg bioaccumulation in aquatic food-webs. Black alder (*Alnus glutinosa*) swamps, however, net degrade MeHg. This paper reports the mechanisms of MeHg demethylation in one such swamp, shown to be a sink for MeHg over four consecutive years. The potential demethylation rate constant in soil incubations was ~3 times higher in the downstream as compared to the upstream part of the swamp. This difference concurred with increased stream and soil pH and a change in plant community composition. Though methanogen-specific transcripts (*mcrA*) were found throughout the wetland, transcripts clustering with *Methanosaetaceae* suggested a possible role for these acetoclastic methanogens in MeHg degradation. *See additional information on this work in R.M. Kronberg's thesis at* https://pub.epsilon.slu.se/10994/.

DIOXIN DEGRADATION AND METAL BIOVOLATILIZATION AT A FORMER WOOD TREATING SITE
Hardy, L.
RemTech 2017: Remediation Technologies Symposium. Presentation 18, 27 slides, 2017

A contamination assessment of a former wood treating site was completed in 2015. Work in the 1990s provided reliable results for a metal and chlorophenols hot spot where sludge from the wood treating process was burned as a waste management practice from 1967 until 1970. The 2015 results confirmed that dioxins, chlorophenols, and metals were the main contaminants at the site, but significant natural attenuation of all contaminants had occurred since site closure in 1970. These results were attributed to reductive dechlorination of dioxins and chlorophenols and to biovolatilization of metals.
Slides: http://www.esaa.org/wp-content/uploads/2017/10/17-Hardy.pdf
Longer abstract: http://www.dioxin2017.org/uploadfiles/others/9632_0504083747.pdf

COMPARISON OF PASSIVE AND ACTIVE AIR SAMPLING (PAAS) METHODS FOR PCBS: A PILOT STUDY IN NEW YORK CITY SCHOOLS
Hunt, G., M. Lorber, K. Thomas, M. Maddaloni, E. Gerdts, E. Denly, J. Bourbon, & A. Signa.
Dioxin 2017, August 20-25, Vancouver, Canada.

In cooperation with U.S. EPA, two school buildings in the City of New York with indoor air PCB concentrations expected to be >50 ng/m^3 were selected for the PAAS study. The 6-day sampling event occurred during September 2016 when school was not in session. Active air samples were collected using a low-volume SKC AirChek® XR-5000 personal sampling pump equipped with a glass cylinder containing polyurethane foam (PUF) sorbent for the collection of PCBs in accordance with EPA Method TO-10A. Tisch Environmental Model TE-200-PAS Passive Air Samplers with PUF disks were utilized for passive air sampling. Results from the 26 active and 10 passive air samples analyzed for 209 PCB congeners using USEPA Method 1668A are presented in a table.
http://www.dioxin2017.org/uploadfiles/others/9701_0515154246.pdf

TAKING SEDIMENT DEPOSITION INTO ACCOUNT FOR ADVERSE EFFECTS OF ACTIVATED CARBON ON BENTHIC ORGANISMS: A COMPARISON BETWEEN FIELD AND LABORATORY RESULTS
Puvanenthirarajah, Subramaniam, Master's thesis, University of Eastern Finland, 46 pp, 2017

This study investigated the influence of sedimentation on the adverse effects of activated carbon (AC) on benthic organisms in field and lab experiments. A plot of 300 m^2 of sediment was capped with 1000 kg of pressed SediMite® pellets at Lake Kernaalanjaervi, followed 10 months later by a benthic fauna survey. Base test sediment was capped with 1.2 kg/m^2 AC and topped with five different sediment doses from 1.32 to 13.23 kg/m^2. *Lumbriculus variegatus* was exposed on each test area for 28 days. Adverse effects of AC on benthic organisms were not obvious in the field experiment, whereas clear adverse effects of AC were seen in the lab. In the field, the reproduction and growth rate of *L. variegatus* moderately correlated with the number of top sediment doses on AC. Results suggest that adverse effects of AC can be mild if new sediment is formed over the AC deposit, with no greater adverse effects expected over the long term.
http://epublications.uef.fi/pub/urn_nbn_fi_uef-20170992/index_en.html

TRANSPORT AND DEGRADATION OF PERCHLORATE IN DEEP VADOSE ZONE: IMPLICATIONS FROM DIRECT OBSERVATIONS DURING BIOREMEDIATION TREATMENT
Dahan, O., I. Katz, L. Avishai, and Z. Ronen.
Hydrology and Earth System Sciences 21:4011-4020(2017)

For a full-scale in situ bioremediation study of a deep vadose zone (~40 m) contaminated with a high concentration of perchlorate (>25,000 mg/L), favorable environmental conditions for biological reduction of perchlorate were sought by infiltrating an electron donor-enriched water solution using drip irrigation beneath an airtight sealing liner. A vadose zone monitoring system was used for real-time tracking of the percolation process, the penetration depth of dissolved organic carbon (DOC), and the variation in perchlorate concentration across the entire soil depth. Conditions for each infiltration event were adjusted according to insights gained in previous stages. Continuous monitoring of the vadose zone indicated that in the top 13 m of the cross section, perchlorate concentration fell dramatically from thousands of mg/L to near detection limits with a concurrent increase in chloride concentration. In the deeper parts of the vadose zone (17 m and below), however, perchlorate concentration increased, suggesting its downward mobilization through the cross section. Breakthrough of DOC and bromide at different depths across the unsaturated zone showed limited migration capacity of biologically consumable carbon and energy sources due to their enhanced biodegradation in the upper soil layers. https://www.hydrol-earth-syst-sci.net/21/4011/2017/hess-21-4011-2017.pdf

MEASURING VAPOR INTRUSION: FROM SOURCE SCIENCE POLITICS TO A TRANSDISCIPLINARY APPROACH
Little, P.C. and K.G. Pennell.
Environmental Sociology 3(2):145-154(2017)

To balance and inform current vapor intrusion (VI) studies, this article explores VI science and policy and develops a critique of "source science politics," offering a transdisciplinary approach to VI as a public health problem that highlights collaboration with social scientists and affected communities and cultivates empathy with the state of belief or point of view of affected individuals.
https://digitalcommons.ric.edu/cgi/viewcontent.cgi?article=1386&context=facultypublications

SOIL TRACE ELEMENT CHANGES DURING A PHYTOREMEDIATION TRIAL WITH WILLOWS IN SOUTHERN QUEBEC, CANADA
Courchesne, F., M.-C. Turmel, B. Cloutier-Hurteau, G. Tremblay, L. Munro, J. Masse, and M. Labrecque.
International Journal of Phytoremediation 19(7):632-642(2017)

This study determined the changes in As, Cd, Cu, Ni, Pb, and Zn (trace element, or TE) chemistry in the soils of a willow plantation growing in a cold climate during a 3-year trial. The soil HNO_3-extractable and H_2O-soluble TE concentrations and pools significantly decreased under most cultivars, yet TE changes showed inconsistent patterns, and localized soil TE increases were measured. Temporal changes in soil TE were also detected in control plots and sometimes exceeded changes in planted plots. Discrepancies were observed between the amount of soil TE change and willow TE uptake, except for Cd and Zn. Results indicated that phytoremediation with willows could reduce soil Cd and Zn within a decadal timeframe in moderately contaminated soils, but the time needed to reduce soil As, Cu, Ni, and Pb would be too long to be efficient.*This work is part of the GenoRem project. See a GenoRem poster at* http://www.genomequebec.com/DATA/NOUVELLE/56_en~v~GenoRem_at_the_9th_International_Phyto_Society_Conference.pdf.

DESIGNING STRATEGIES FOR OPERATING MICROBIAL ELECTROCHEMICAL SYSTEMS TO CLEAN UP POLLUTED SOILS UNDER NON-FLOODED CONDITIONS
Dominguez-Garay, A. and A. Esteve-Nunez.
Bioelectrochemistry [Published online 17 Mar 2018 prior to print]

Microbial electrochemical systems can be set up in soil for the harvesting of energy from microbial metabolism (sediment microbial fuel cell) or the bioremediation of contaminated environments (microbial electroremediating cell, MERC). Early thinking was that these technologies must be located in flooded environments to assure ionic contact between anode and cathode; however, a new configuration has been developed that overcomes this limitation by integrating an out-of-soil cathodic chamber with a ceramic barrier such that a closed-circuit system can be achieved without flooding the soil. In addition to harvesting energy with this new configuration, the MERC configuration was used to restore an atrazine-contaminated soil as proof of concept of enhanced bioremediation. Results showed that >98% of the initially available atrazine was removed within 2 weeks with the MERC configuration, in contrast with a 58% removal obtained under natural conditions. Toxicological tests conducted using green algae, *Salmonella typhimurium*, and *Sorghum saccharatum* confirmed a dramatic decline in soil toxicity after bioelectrochemical treatment in contrast with the still-toxic soil under natural conditions. *See additional information in Chapters 4 and 5 of A. Dominguez-Garay's thesis at* https://ebuah.uah.es/dspace/handle/10017/26377.

ELECTROCHEMICAL TREATMENT OF PERFLUOROOCTANOIC ACID AND PERFLUOROOCTANE SULFONATE: INSIGHTS INTO MECHANISMS AND APPLICATION TO GROUNDWATER TREATMENT
Schaefer, C.E., C. Andaya, A. Burant, C.W. Condee, A. Urtiaga, T.J. Strathmann, C.P. Higgins.
Chemical Engineering Journal 317:424-432(2017)

Electrochemical treatment of PFOA and PFOS using a nanocrystalline boron-doped diamond (BDD) anode was investigated in bench-scale batch experiments to assess the impacts of chloride electrolyte and of hydroxyl radical scavenger TBA on PFOA and PFOS removal rates and corresponding rates of defluorination. Treatment of 0.3 mg/L PFOA and 0.6 mg/L PFOS in natural groundwater was also evaluated and compared to results obtained in electrolyte solutions with elevated PFOA (15 mg/L) and PFOS (10 mg/L) concentrations. The presence of chloride and TBA had minimal effects (decreasing rates by2) at both low and elevated PFOA/PFOS concentrations. Treatment rates of PFOA and PFOS in natural groundwater were within a factor of two of those measured in electrolyte at a current density of 15 mA/cm^2 (for both low and concentration experiments). Results indicate that hydroxyl radical scavengers that might be present in natural groundwater are unlikely to have a major adverse impact on PFOA and PFOS electrochemical treatment. The study demonstrated that perchlorate produced by BDD oxidation of Cl^- could be treated in bioaugmented sand columns with 3 orders of magnitude removal observed in 9 days of residence time.
https://grupos.unican.es/tab/Publicaciones/2017/1.%20Schaefer%20et%20al%202017.pdf

ESTIMATING THE NUMBER OF AIRPORTS POTENTIALLY CONTAMINATED WITH PERFLUOROALKYL AND POLYFLUOROALKYL SUBSTANCES FROM AQUEOUS FILM FORMING FOAM: A CANADIAN EXAMPLE
Milley, S.A., I. Koch, P. Fortin, J. Archer, D. Reynolds, and K.P. Weber.
Journal of Environmental Management 222:122-131(2018)

Researchers are still investigating the extent to which emerging contaminants such as per- and polyfluoroalkyl substances (PFASs) have contaminated soil, groundwater, and surface water as a result of the release of aqueous film-forming foam (AFFF) into the environment. To evaluate the scope of the issue in Canada, researchers developed a decision tree to estimate the number of potentially PFAS-affected airport sites in Canada due to AFFF releases. The screening process was completed using publicly available resources: airport websites, the Canadian Owners and Pilots Association website, Sky Vector, Transport Safety Board of Canada aviation investigation reports, the Aviation Safety Network website, and Google maps. The methodology presented could be used to identify additional PFAS impacted sites in Canada or other jurisdictions worldwide. Of 2,071 airport/heliport sites in Canada to which the decision tree was applied, indications are that 152 of the sites likely have PFAS contamination as a result of the use of AFFF at firefighter training areas or accidents where fires occurred.

THE CHALLENGES OF PFAS REMEDIATION
Darlington, R., E. Barth, and J. McKernan.
Military Engineer 110(712):58-60(2018)

Many military bases and their surrounding communities are affected by contamination with per- and polyfluoroalkyl substances (PFASs) from aqueous film-forming foams. Soil sorption technologies provide a promising solution to immobilize PFASs in the soil and prevent groundwater and drinking water contamination. This article is the result of a collaborative effort between Battelle and U.S. EPA to review the most promising technologies.
http://samenews.org/the-challenges-of-pfas-remediation/

General News

ILLUSTRATED GUIDE FOR THE DISPOSAL OF CHEMICALS USED IN THE ILLICIT MANUFACTURE OF DRUGS
United Nations Office on Drugs and Crime, Vienna, 119 pp, 2017

This illustrated disposal guide focuses on basic safety, handling, storage, and disposal procedures for chemicals associated with the manufacture of illicit drugs. It is intended specifically for use in remote locations that lack an appropriate waste management infrastructure or expert technical support and where there is an immediate need for the timely management or disposal of potentially hazardous seized chemicals or waste. It is acknowledged that some of the disposal procedures detailed in this guide may result in temporary environmental degradation; however, where followed appropriately, the procedures detailed will substantially reduce or eliminate potential risks to responder and resident human health, communities, and the environment.
https://www.oecd-ilibrary.org/public-health/illustrated-guide-for-the-disposal-of-chemicals-used-in-the-illicit-manufacture-of-drugs_d819611f-en

ENVIRONMENTAL RESTORATION WIKI FOR ENHANCED TRANSFER OF SERDP AND ESTCP RESEARCH TO USERS
ESTCP Project ER-201569-T2, 2018

The Enviro Wiki is a project funded by DoD's Environmental Security Technology Certification Program. This project is designed to make prior SERDP and ESTCP-funded research more readily available. The project creates an online collaboration of invited experts who address specific topics relevant to environmental restoration of contaminated soil and groundwater. The wiki format will allow search and retrieval of articles, reports, and scientific papers on current developments in remediation technologies. https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/ER-201569-T2
Visit Enviro Wiki at http://www.environmentalrestoration.wiki/index.php?title=Main_Page.

TEST NO. 318: DISPERSION STABILITY OF NANOMATERIALS IN SIMULATED ENVIRONMENTAL MEDIA
OECD Guidelines for the Testing of Chemicals, Section 3, OECD Publishing, Paris. 32 pp, 2017

Dispersion stability of nanomaterials is an important parameter affecting nanomaterial environmental behavior. This parameter depends on the physicochemical characteristics of the nanomaterial itself, the physicochemical characteristics of the suspension medium, suspension preparation, concentration of the nanomaterial, and concentration of other substances and particles in the suspension. This guideline describes a test procedure to gain information on dispersion stability of manufactured nanomaterials in simulated environmental media. Based on the results it is possible to categorize tested nanomaterials into three different classes according to their dispersion stability in tested aqueous media, i.e., as nanomaterials of low dispersion stability or high dispersion stability under given conditions, and as nanomaterials with condition-depending dispersion stabilities. http://dx.doi.org/10.1787/9789264284142-en

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