

# Technology Innovation News Survey

## Entries for January 1-15, 2021

### Market/Commercialization Information

#### RFP CHEMICAL, ENVIRONMENTAL, AND MUNITIONS (UNRESTRICTED) - CHEM-RU

U.S. Army Corps of Engineers (USACE), Engineering and Support Center, Huntsville, AL.  
Contract Opportunities at Beta.SAM, Solicitation W912DY-20-R-016, 2021

The objective of this ChEM-RU multiple-award task-order contract (MATOC) is to procure Contractor services to perform Military Munitions Response Program responses involving conventional munitions and chemical warfare materiel; environmental compliance and remediation services; and other munitions-related services. USACE Huntsville intends to award multiple IDIQ-type contracts to both large and small businesses under NAICS code 562910. This MATOC will have a base ordering period of 60 months with one 36-month option and one 24-month option. Task orders will be awarded as firm fixed price and cost plus fixed fee. The total programmatic capacity for the MATOC is \$1.136B over a period of 10 years if all options are exercised. Offers are due by 2:00 PM CT on February 22, 2021. <https://beta.sam.gov/opp/6be3cb35e5984972bdb263e023bb80d0/view>

#### TRITIUM SYSTEMS DEMOLITION AND DISPOSAL

Princeton Plasma Physics Laboratory - DOE Contractor, Princeton, NJ.  
Contract Opportunities at Beta.SAM, Solicitation RF121-TSDD-01, 2021

The proposed procurement will be unrestricted under NAICS code 562910. The purpose of this notice is to obtain information regarding the availability and capacity of sources that can perform demolition and disposal of legacy tritium systems and equipment from the Princeton Plasma Physics Laboratory (PPPL), located in Plainsboro, NJ. PPPL contemplates award of a firm-fixed-price subcontract of between \$12M and \$22M. At this time, PPPL is soliciting expressions of interest and capability with any comments or questions regarding the draft SOW (attached at beta.sam). Responses are due by 4:00 PM ET on March 1, 2021. The current plan is to issue the solicitation in March 2021 and award a subcontract in May 2021. <https://beta.sam.gov/opp/86c446eb1ed142bdbb8d56793264dbf2/view>

#### PFAS SOIL TREATMENT AND/OR DISPOSAL, EIELSON AIR FORCE BASE, ALASKA

U.S. Army Corps of Engineers, Alaska District, Anchorage, AK.  
Contract Opportunities at Beta.SAM, Solicitation W911KB21R0029-SS, 2021

This sources sought is open to all qualified prime contractor firms (i.e., businesses large and small) under NAICS code 562910. The USACE Alaska District is conducting market research to facilitate a determination of acquisition strategy and identify firms that have the capability to perform the following work: Treat and/or dispose of about 160,000 cubic yds of soil contaminated with per- and polyfluoroalkyl substances (PFAS) from work associated with 14 separate F-35 construction projects at Eielson AFB. Treatment could be conducted on site or at an approved off-site treatment facility. Disposal would occur at a permitted RCRA Subtitle C or D landfill, as appropriate. Treated soil (for on-site treatment only) will be placed at an approved location on the installation. This requirement is a performance-based services acquisition. Capability statements are due by 2:00 PM Alaska Time on March 3, 2021. <https://beta.sam.gov/opp/76407a9fd3e24573a8dcb9f9034a4189/view>

#### RANGE SUSTAINMENT AND REMEDIATION ENVIRONMENTAL SERVICES AT DEPARTMENT OF DEFENSE AND OTHER GOVERNMENTAL AGENCIES

Naval Facilities Engineering Systems Command Southwest, San Diego, CA.  
Contract Opportunities at Beta.SAM, Solicitation N6247321R3205, 2021

This sources sought is issued for market research to determine the availability of potentially qualified small business sources -- 8(a), HUBZone, veteran-owned, service-disabled veteran-owned, woman-owned, small business, and small disadvantaged business firms under NAICS code 562910, size standard 750 employees -- to perform range sustainment and remediation services. Performance will be mainly on Navy and Marine Corps installations in California, with projects occurring simultaneously at multiple sites. Work will be accomplished under task orders written against an IDIQ contract having a 12-month base and four 12-month options, estimated value around \$95M. Capabilities statements are due before 12:00 noon PT on March 4, 2021. <https://beta.sam.gov/opp/0802bc1efa4b4b3b8e308713bf3df3a/view>

#### ENVIRONMENTAL SYSTEM SCIENCE

Department of Energy, Office of Science, Funding Opportunity DE-FOA-0002392, 2020

The DOE SC program in Biological and Environmental Research invites applications for research in Environmental System Science. The program seeks to develop an integrated framework using a systems approach to unravel the complex processes and controls on the structure, function, feedbacks, and dynamics of terrestrial ecosystems, spanning from bedrock through the rhizosphere and vegetation to the atmospheric surface layer. Total estimated program funding is \$8M. The closing date for applications is March 4, 2021. <https://www.grants.gov/web/grants/view-opportunity.html?oppid=329897>

#### ENVIRONMENTAL SUPPORT SERVICES IDIQ

U.S. Army Corps of Engineers (USACE) Wilmington District, Wilmington, NC.  
Contract Opportunities at Beta.SAM, Solicitation W912PM20R0028, 2021

This RFP is an 8(a) set-aside under NAICS code 541620. The USACE Wilmington District is soliciting for a full range of environmental and related services to USACE and its customers. It is the Government's intent to award a single firm-fixed-price IDIQ for a base year of 12 months and four 12-month options. The services required by this contract will be provided for the USACE's South Atlantic Division and its customers for work located mainly in the states of North Carolina and Virginia, but potentially including South Carolina, Georgia, Florida, Alabama, and Mississippi. Offers are due by 2:00 PM ET on March 9, 2021. <https://beta.sam.gov/opp/81ba2063d5d34cc3b72b4653413b24ae/view>

#### MEGA SMALL BUSINESS PRE-PLACED REMEDIAL ACTION CONTRACT (PRAC)

U.S. Army Corps of Engineers (USACE), Kansas City, MO.  
Contract Opportunities at Beta.SAM, Solicitation W912DQ21R3004, 2021

The PRAC is a total small business set-aside to support work assigned to the USACE Northwestern Division and EPA Region 2 for remediation projects under NAICS code 562910. Under the maximum quantity for all orders of \$176.25M, contracts will have a basic ordering period of three years plus one two-year option for this IDIQ multiple-award task-order contract (MATOC). Offers are due by 12:00 noon CT on March 15, 2021. <https://beta.sam.gov/opp/53b0d31c8a3c40ed29697e2cd3a83e2/view>

### Cleanup News

#### RISK TO ECOLOGICAL RESOURCES FOLLOWING REMEDIATION CAN BE DUE MAINLY TO INCREASED RESOURCE VALUE OF SUCCESSFUL RESTORATION: A CASE STUDY FROM THE DEPARTMENT OF ENERGY'S HANFORD SITE

Burger, J., M. Gochfeld, D.S. Kosson, K.G. Brown, J.A. Salisbury, and C. Jeitner.  
Environmental Research 186:109536(2020)

This paper reports the risk to ecological resources before, during, and as a consequence of remediation, including a restoration phase, and examines the causes for changes in risk by evaluating 56 cleanup evaluation units at the Hanford Site. Remediation often causes physical disruption to ecosystems as it reduces the risk from exposure to contaminants. Most new remediation projects at the Hanford Site include ecological restoration, which results in the potential for higher quality resources after remediation. Evaluation of the risk to ecological resources following remediation indicated that a significant percentage of units (61%) will be at increased risk in the post-remediation period because successful remediation and restoration results in a higher percent of native vegetation and higher ecological value. These newly created resources can be at risk due to the potential for spread of invasive species and noxious grasses used in previous cleanup actions, disruption of ecosystems (including those with state or federally listed species and unique ecosystems), compaction of soil, use of pesticides to control invasive species, and the eventual need for continued monitoring activities. Thus, post-remediated units are at risk unless care is taken to protect them. Many of the negative effects of both remediation and future monitoring (or other future land uses) can be avoided by planning and management early in the remediation process.

#### ONE-OFF GEOPHYSICAL DETECTION OF CHLORINATED DNAPL DURING REMEDIATION OF AN INDUSTRIAL SITE: A CASE STUDY

Florentino, E.-A., S. Warden, M. Bano, P. Sailhac, and T. Perrier.

This paper describes a geophysical survey performed on an industrial site impacted by a chlorinated DNAPL. The precise location of the contamination was needed for the treatment of the saturated zone, while the unsaturated zone was remediated by excavating sediments, followed by separate treatment. As this excavation allowed to get closer to the saturated zone, geophysical measurements were conducted at the bottom of the pit. Although electrical resistivity tomography measurements brought little information, ground-penetrating radar drew the remediation operations towards an area that preliminary point measurements had not identified as a possible source location. <https://hal.archives-ouvertes.fr/hal-03117514/document>

#### RAPID CLEANUP OF A PERCHLORATE PLUME FROM FIREWORKS

Andrews, C.B., J. Henry, and A. Anderson-Vincent.  
Groundwater [Published 31 January 2021 prior to print]

Perchlorate was detected in six wells of a municipal wellfield in Evart, Michigan in April 2015 at concentrations ranging up to 20 µg/L. An investigation identified the source as fireworks launched during the annual 4th of July show at the fairgrounds upgradient. Launching of approximately 600 kg of fireworks during the annual display resulted in an approximate annual loading of 4 kg of perchlorate to groundwater. An aggressive groundwater extraction system began operation in June 2016 to restore water quality in the affected aquifer, and the 2016 fireworks display was relocated outside the capture zone of the water supply wells. Within 18 months, average perchlorate concentrations in the water supply wells had been reduced to about 0.6 µg/L. The extraction system continued to operate through the end of 2019, by which time the average perchlorate concentrations in the water supply wells were reduced to 0.2 µg/L. In 2019, approximately 0.4 kg of perchlorate were removed from the aquifer, about one-half of the amount removed in 2018, reflecting the slow leaching of perchlorate of fireworks residuals from vadose zone soils.

#### URANIUM ATTENUATED BY A WETLAND 50 YEARS AFTER RELEASE INTO A STREAM

Kaplan, D.I., R. Smith, C.J. Parker, M. Baker, T. Cabrera, B.O. Ferguson, K.M. Kemner, M. Laird, C. Logan, J. Lott, L. Manglass, N.E. Martinez, D. Montgomery, J.C. Seaman, M. Shapiro, and B.A. Powell. | ACS Earth and Space Chemistry 4(8):1360-1366(2020)

The inventory of uranium (U) remaining in a wetland was calculated 50 years after the Fuel Fabrication Facility on the Savannah River Site released 43.5 mg of U into the nearby environment. Over 232,700 gamma spectra and their associated global positioning system coordinates were collected and collated into a map of the contaminated land area. Five core samples were collected that contained U concentrations up to 14,099 mg/kg (background levels are about 2.7 mg/kg U). The contaminated area was 278,000 m<sup>2</sup> and contained 36.2 Mg U, about 83% of the U released. About 80% of the U in the wetland was concentrated in a former beaver pond, comprising 26% of the contaminated area. This contaminated wetland area was almost 2 km from the source, indicating that it comprised unique hydro-biogeochemical properties for immobilizing the released U.

### Demonstrations / Feasibility Studies

#### FIELD APPLICATION OF A REAGENT FOR IN SITU CHEMICAL REDUCTION AND ENHANCED REDUCTIVE DICHLORINATION TREATMENT OF AN AQUIFER CONTAMINATED WITH TETRACHLOROETHYLENE (PCE), TRICHLOROETHYLENE, 1,1-DICHLOROETHYLENE, DICHLOROPROPANE AND 1,1,2,2-TETRACHLOROETHANE (R-130)

Leombruni, A., M. Mueller, A. Seech, and D. Leigh.  
Environmental Engineering and Management Journal 19(10):1791-1796(2020)

Groundwater at an abandoned industrial area near Bergamo, Italy, was contaminated by PCE (>100 µg/L) and, to a lesser extent, TCE, DP, and 1,1,2,2-tetrachloroethane (R-130). EHC® Liquid was selected to remediate the groundwater. The reagent was provided as EHC® Liquid Mix (a soluble organo-iron salt) and ELS® Microemulsion (a lecithin-based carbon substrate), designed to promote both in situ chemical reduction and enhanced reductive dechlorination. The two components were mixed with water and injected into the subsurface. Once in groundwater, EHC Liquid rapidly generated highly reduced conditions, favoring both biotic and abiotic dechlorination reactions. Less than 6 months after the injection of EHC Liquid in the main source area, concentrations of the target contaminants reached the site-specific remediation target values) in the main monitoring piezometers, demonstrating the effective establishment of enhanced biotic and abiotic reducing conditions and degradation of the target compounds. [http://www.eemj.icpm.tuiasi.ro/pdfs/vol19/no10/Full/17\\_100\\_Leombruni\\_20.pdf](http://www.eemj.icpm.tuiasi.ro/pdfs/vol19/no10/Full/17_100_Leombruni_20.pdf)

#### A COUPLED OPTIMIZATION OF GROUNDWATER REMEDIATION ALTERNATIVES SCREENING UNDER HEALTH RISK ASSESSMENT: AN APPLICATION TO A PETROLEUM-CONTAMINATED SITE IN A TYPICAL COLD INDUSTRIAL REGION IN NORTHEASTERN CHINA

Chen, R., Y. Teng, H. Chen, W. Yue, X. Su, Y. Liu, and Q. Zhang.  
Journal of Hazardous Materials 407:124796(2021)

This study presents a novel method for health risk assessment (HRA) and demonstrates a multicriteria decision analysis (MCDA) based on HRA to select the most suitable remediation alternatives of groundwater and prioritize contaminated site management. A site contaminated with benzene and 1,2-DCE in Longtan, Jilin province, was used to demonstrate the HRA and MCDA processes. The health risk range was significantly greater in winter than in summer. Four remediation alternatives were proposed based on the HRA results. The MCDA results showed that a permeable reactive barrier was the most suitable technology for integrating the relevant environmental, social, economic, and technical aspects required for remediation. The process may help responsible agencies strengthen local risk-based program screening frameworks for contaminated sites, promote reconstruction projects, and increase local public confidence in contaminated site remediation.

#### FIELD TRACER TESTS TO EVALUATE TRANSPORT PROPERTIES OF TRYPTOPHAN AND HUMIC ACID IN KARST

Frank, S., N. Goeppert, and N. Goldscheider. | Groundwater 59(1):59-70(2021)

Comparative tracer tests were conducted at an experimental karst site in the Austrian Alps to investigate the transport properties and behavior of tryptophan and humic acid in a natural karst aquifer. The tracers were compared with conservative tracer uranine. Fluorescence measurements were conducted with an online field fluorometer and in the lab. The breakthrough curves and the modeling results demonstrated that: (1) the online field fluorometer is suitable for real-time fluorescence measurements of all three tracers; (2) the transport parameters obtained for uranine, tryptophan, and humic acid are comparable in the fast flow areas of the karst system; (3) the transport velocities of humic acid are slower and the resulting residence times are accordingly higher, compared to uranine and tryptophan, in the slower and longer flow paths; (4) the obtained BTCs reveal additional information about the investigated karst system. The experiments showed that tryptophan's transport properties are like those of uranine, while humic acid is partly transported more slowly and with retardation. These findings allow a better and quantitative interpretation of results when these substances are used as natural fecal and contamination indicators. *This paper is Open Access at* <https://nqwa.onlinelibrary.wiley.com/doi/10.1111/gwat.13015>.

#### QUANTIFICATION OF TOLUENE PHYTOEXTRACTION RATES AND MICROBIAL BIODEGRADATION FUNCTIONAL PROFILES AT A FRACTURED BEDROCK PHYTOREMEDIATION SITE

Ben-Israel, M., P. Wanner, J. Fernandes, J.G.Burken, R. Aravena, B.L. Parker, E.A. Haack, D.T. Tsao, and K.E. Dunfield. | Science of The Total Environment 707:135890(2020)

A field study evaluated a mature hybrid poplar phytoremediation system's ability to remediate toluene in a fractured bedrock aquifer. Peak-season toluene mass removal rates ranging from 313-743 µg/day were quantified using passive *in planta* contaminant sampling techniques and continuous heat dissipation transpiration measurements in tree stems. Poplar roots were colonized mostly by *Proteobacteria*, *Actinobacteria*, and *Bacteroidetes*. In the source area, distinct, more uniform communities were observed in roots associated with trees planted in the toluene, with differences apparent at lower taxonomic levels. Significant enrichment of *Streptomyces* in roots was observed, implicating that genus as a potentially important poplar endophyte at toluene-impacted sites. Significantly greater aerobic toluene biodegradation capacity was predicted in source area roots than in other areas using taxonomic functional modeling. Passive sampling and molecular results provided supporting evidence of biodegradation activity in the source area and contextualized the detected phytoextraction patterns. Results support the application of phytoremediation systems for aromatic hydrocarbons in environments with complex geology and demonstrate field-validated monitoring techniques to assess phytoextraction and biodegradation in these systems.

### Research

#### POTENTIAL MICROBIAL INDICATORS FOR BETTER BIOREMEDIATION OF AN AQUIFER CONTAMINATED WITH VINYL CHLORIDE OR 1,1-DICHLOROETHENE

Chen, T.-W. and S.-C. Chang. | Water, Air, & Soil Pollution 231:239(2020)

Predominance, correlation, and principal component analysis were integrated to test results of VC and 1,1-DCE biodegradation under seven different nutrient-amendment conditions. Next-generation sequencing was applied to 15 microbial communities. The inoculum was from a contaminated site with accumulated 1,1-DCE and VC. Results indicated that bacteria of the *Ruminococcaceae* family, *Syntrophomonas* sp., *Pseudomonas stutzuri*, *Candidatus Methanoregula*, and *Methanospirillum* sp. could be microbial indicators for 1,1-DCE and VC biodegradation. The results suggest that a variety of combinations of bacteria and archaeal species can effectively remove 1,1-DCE but less so for VC.

## SCALE-UP OF ELECTROKINETIC PROCESS FOR DREDGED SEDIMENTS REMEDIATION

Benamar, A., M.T. Ammami, Y. Song, and F. Portet-Koltalo. *Electrochimica Acta* 352:136488(2020)

Lab experiments were performed at two scales (0.4 kg and 40 kg of dredged sediment) to evaluate the potential of electrokinetic remediation (EKR) process on organic and inorganic contaminants and the scaling-up effect. Mixtures of citric acid combined with a Tween 20 nonionic surfactant were promising candidates for simultaneous EKR of a multi-contaminated harbor sediment. The values of energy consumption from large-scale tests showed that efficient decrease of pollutant concentrations and sustainable remediation could be achieved with moderate energy costs. Better removals of Cr, PAHs, and PCBs were achieved with the large-scale device using less energy and additives. However, the distribution of the pollutants in the specimen after EKR indicated that the electric field did not totally control the migration process. The interaction with likely heterogeneity and inertial effects reduced the EK effectiveness in large-scale tests.

## EFFECTS OF SOIL AMENDMENT WITH PCB-CONTAMINATED SEDIMENT ON THE GROWTH OF TWO CUCURBIT SPECIES

Urbanik, M., S. Lee, M. Takazawa, E. Mierzejewska, A. Baran, and K. Kannan. *Environmental Science and Pollution Research* 27:8872-8884(2020)

A study evaluated the impact of applying increasing proportions (0%, 10%, 25%, 50%, 75%, and 100%) of a PCB-contaminated Hudson River sediment admixture on soil properties. The study also tested the impact of the admixture on the phytotoxicity of increasing proportions on *Lepidium sativum* and biometric and physiological responses of cucumber (*Cucumis sativus* L. cv) and zucchini (*Cucurbita pepo* L.) grown as potential phyto- and rhizoremediators. The experiment was performed in a growth chamber under controlled conditions. Results suggest that admixture of riverine sediment from relatively less-contaminated locations may be used as soil amendments under controlled conditions. However, further detailed investigations on the fate of pollutants are required, especially in terms of bioaccumulation and biomagnification properties of PCBs, before contaminated sediment can be applied in an open environment. This paper is **Open Access** at <https://link.springer.com/article/10.1007/s11356-019-06509-9>

## ISOLATION AND CHARACTERIZATION OF PB-RESISTANT PLANT GROWTH PROMOTING ENDOPHYTIC BACTERIA AND THEIR ROLE IN PB ACCUMULATION BY FAST-GROWING TREES

Yongpisanphop, J., S. Babel, F. Kurisu, M. Kruatrachue, and P. Pokethitayook. *Environmental Technology* 41(27):3598-3606(2020)

Three Pb-tolerant endophytic bacteria were isolated from the roots of *Pityrogramma calomelanos* (PC). All isolates were similar to *Pseudomonas* and tolerated Pb concentration up to 1,850 mg/L, producing siderophores and solubilized phosphate. A Pc isolate closely related to *Pseudomonas psychrophile* showed the highest water-soluble Pb in solution and contaminated soil. This isolate was chosen to study the effects on Pb accumulation in the roots of *Acacia mangium* and *Eucalyptus camaldulensis* in a hydroponic experiment. Results suggest that the Pc isolate effectively promoted the phytoremediation potential of *A. mangium*, but it was not useful for *E. camaldulensis*.

## COMBINATION OF ZEOLITE BARRIER AND BIO SPARGING TECHNIQUES TO ENHANCE EFFICIENCY OF ORGANIC HYDROCARBON REMEDIATION IN A MODEL OF SHALLOW GROUNDWATER

Ahmadnezhad, Z., A. Vaezihir, C. Schuth, and G. Zarrini. *Chemosphere* [Published online 13 October 2020 prior to print]:128555

Natural clinoptilolite-heulandite zeolite (CH-Z) and a consortium of *Variovorax* sp. OT16, *Pseudomonas balearica* OT17, and *Ornithinibacillus* sp. OT18 were utilized in a permeable reactive barrier (PRB) to remove benzene, toluene, and ethylbenzene (BTE) from contaminated shallow groundwater. Following batch testing, an aerobic PRB system was designed and investigated in a continuous flow sand-tank model to assess the efficiency of combining zeolite and biosparging to remediate groundwater. Phase involved a zeolite-only barrier. In Phases II and III, the PRB was fed by microorganisms. Results showed high ability of C-HZ to treat BTE. Combining C-HZ with biosparging improved the efficiency of BTE remediation. However, slow biodegradation rates and the continuous injection of BTE in the model confirmed that a longer time was needed for the PRB to function optimally.

## HIGH-PERFORMANCE TREATMENT OF PFAS FROM INVESTIGATION-DERIVED WASTE: INTEGRATING ADVANCED OXIDATION-REDUCTION AND MEMBRANE CONCENTRATION

Liu, J., S. Lin, and M. Sun. SERDP Project ER18-1497, 60 pp, 2020

This one-year project evaluated and optimized the operation parameters for three individual treatment modules (advanced reduction process, a persulfate/hydroxide digestion advanced oxidation process, and nanofiltration) and a combined treatment train to remediate aqueous wastes containing PFAS from aqueous film-forming foam. The destruction of PFAS was achieved by applying the advanced reduction process using hydrated electrons and the advanced oxidation process using hydroxyl radicals. To ensure the efficient use of chemicals and energies, nanofiltration was added to reduce the volume of investigation-derived waste. <https://www.serdp-estcp.org/content/download/52586/517770/file/ER18-1497%20Final%20Report.pdf>

## COMBINED FLUORESCENT MEASUREMENTS, PARALLEL FACTOR ANALYSIS AND GC-MASS SPECTROMETRY IN EVALUATING THE PHOTODEGRADATION OF PAHS IN FRESHWATER SYSTEMS

Seopela, M.P., L.C. Powers, C. Clark, A. Heyes, and M. Gonsior. *Chemosphere* 269:129386(2021)

A custom-designed closed-circuit recirculation photodegradation system, inline semi-continuous fluorescence and absorbance measurements, excitation-emission measurement modeling, parallel factor analysis, and GC-MS analysis were combined to create a robust tool to assess the photodegradation of individual PAHs, their mixtures, and photoproduct formation. Twenty-four-hour photodegradation experiments were conducted in solutions simulating ideal (ultrapure water) and environmentally-relevant conditions (1.00 mg/L Suwannee River Natural Organic Matter [NOM]). The decline in parent molecule concentration occurred rapidly within 200 min. Degradation rates increased with aromaticity (6-ring >> 2-ring PAHs) and followed pseudo-first-order degradation kinetics. NOM influenced the diversity of photoproducts. While photoproducts were only detected in anthracene, benzo(a)anthracene, and the PAH mixture solutions, optical property analyses indicated that diverse changes occurred with all PAHs. Parent PAHs and photoproducts co-existed at various stages, which is significant for PAH-contaminated freshwater systems if photoproducts have higher-toxic potential.

## A NEW PERSPECTIVE TOWARDS IN-SITU COLD PLASMA REMEDIATION OF POLLUTED SITES: DIRECT GENERATION OF MICRO-DISCHARGES WITHIN CONTAMINATED MEDIUM

Aggelopoulos, C.A. and C.D. Tsakiroglou. | *Chemosphere* 266:128969(2021)

A lab-scale coaxial dielectric barrier discharge (DBD) plasma reactor was used to remediate bauxite samples highly contaminated by oil sludge. The contaminated medium is handled as a part of the electrical discharge, while the plasma discharges are produced directly within the contaminated porous medium under treatment, thus scattering reactive species directly in the air contained inside its interconnected pores. A very high TOC removal (~70%) was achieved after 30 min of plasma treatment time with a corresponding energy consumption of 0.53 kWh/kg. Carbon balance analysis of the exhaust gases revealed that 61% of the removed pollutant was converted to CO<sub>2</sub>, 19% was decomposed to CO, and 20% was emitted as VOCs. Scale-up of the plasma approach could lead to a promising alternative for the fast, cost-effective, and green in-situ remediation of granular porous, hydrocarbon-contaminated sites.

## General News

### PASSIVE SAMPLING FOR VAPOR INTRUSION: LET DIFFUSION DO THE WORK FOR YOU!

Pautler, B., H. Hayes, and T. McAlary.

Midwestern States Environmental Consultants Association Virtual Environmental Conference, 2-3 and 9-10 December, 68 minutes, 2020

This webinar discusses applying passive sampling for soil vapor, indoor air, and outdoor air to support subsurface vapor intrusion to indoor air assessments. The presentation includes theoretical considerations for sampler selection, sorbent selection, sample duration, and uptake rate verification; laboratory considerations for high-quality data; a patented method to quantify soil vapor concentration using the Waterfloo Membrane Sampler™; and benefits relative to conventional summa canister/TO-15 methods of sampling and analysis. <https://www.youtube.com/watch?v=Rf4P9Fduipk>

### CO<sub>2</sub> RADIOCARBON ANALYSIS TO QUANTIFY ORGANIC CONTAMINANT DEGRADATION, MNA, AND ENGINEERED REMEDIATION APPROACHES

Boyd, T.J., M.T. Montgomery, R.H. Cuenca, Y. Hagimoto, M. Vernet, and J. Gonzalez. ESTCP Project Number: ER-2338, 74 pp, 2020

This report summarizes work at the Naval Air Station North Island study sites with preliminary information on deployments at Indian Head Naval Surface Warfare Station. It includes equipment and sampler designs, deployment, and long-term monitoring activities at field sites to determine in situ chlorinated volatile organic compound degradation. Samples from one-year collections at two sites were analyzed for overall respiration (CQ production), CO<sub>2</sub> radiocarbon content, and ancillary measurements (cations, contaminant concentrations, well casing methane). CO<sub>2</sub> collection rate measurements were used to create and refine zone of influence (ZOI) simulations. A two end-member isotope mixing model was used to determine the respiration attributable to fossil (contaminant) source(s) during each one-month CO<sub>2</sub> trap deployment. <https://www.serdp-estcp.org/content/download/52334/514792/file/ER-2338%20Final%20Report.pdf>

### **GUIDANCE FOR MONITORING PASSIVE GROUNDWATER REMEDIES OVER EXTENDED TIME SCALES**

Fritz, B.G., M.J. Truex, V.L. Freedman, C. Bagwell, R.J. Cameron, J. Counts, L.E. Martino, K.C. Picel, J. Quinn, and E.Y. Yan. Pacific Northwest National Laboratory, 66 pp, 2020

This document provides guidance for implementing an extended-scale monitoring (ESM) approach appropriate for long-duration passive remediation. It is intended to facilitate the development of site-specific monitoring plans that consider local site conditions and the selection of appropriate monitoring techniques. ESM applies to slow-moving groundwater contaminant plumes and emphasizes monitoring primarily of potential exposure pathways. The nature of an ESM plan is not to fully understand the dynamics of plume behavior. Rather, ESM confirms that the plume stays within the controlled zone and verifies that the plume behaves as predicted, consistent with the conceptual site model. A standard monitoring tool may be implemented in a nontraditional manner to verify performance. Alternatives to standard monitoring techniques such as well-based sampling and analysis may also be appropriate for some aspects of ESM. A portfolio of approaches is described in this document, including sampling methods currently under development that may reduce costs associated with long-term monitoring. [https://www.pnnl.gov/main/publications/external/technical\\_reports/PNNL-30441.pdf](https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-30441.pdf)

### **BROWNFIELDS AND LAND REVITALIZATION PROGRAM IMPACTS**

Office of Land and Emergency Management, EPA-560-F-20-187, December 2020

A four-page fact sheet describes the impacts of EPA's Brownfields and Land Revitalization Program, which invests in communities across the nation, often providing the initial seed money that encourages brownfields reuse and attracts leveraging. The fact sheet summarizes how the program can assist communities and provides data that document program accomplishments.

[https://www.epa.gov/sites/production/files/2021-01/documents/brownfields\\_and\\_land\\_revitalization\\_program\\_impacts\\_final-508\\_compliant.pdf](https://www.epa.gov/sites/production/files/2021-01/documents/brownfields_and_land_revitalization_program_impacts_final-508_compliant.pdf)

### **FIELD TRIALS OF PHYTOMINING AND PHYTOREMEDIATION: A CRITICAL REVIEW OF INFLUENCING FACTORS AND EFFECTS OF ADDITIVES**

Wang, L., D. Hou, Z. Shen, J. Zhu, X. Jia, Y.S. Ok, F.M.G. Tack, and J. Rinklebe. Critical Reviews in Environmental Science and Technology 50(24): 2724-2774(2020)

This review critically evaluates influencing factors in phytomining and phytoremediation approaches, including contaminant concentrations, fertilizer application, chelating agent addition, planting characteristics, and soil properties. It also summarizes knowledge about additives used in field trials, including biological waste-derived amendments (biochar, compost, sewage sludge, and manure), and discusses utilizing microorganisms and transgenic plants in field trials and the associated biosafety concerns such as horizontal gene transfer. Future research should examine the ecological risks associated with phytomining and phytoremediation. Results of field studies should guide commercial applications of phytomining and phytoremediation.

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](mailto:adam.michael@epa.gov) or (703) 603-9915 with any comments, suggestions, or corrections.

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