

# Technology Innovation News Survey

## Entries for December 16-31, 2020

### Market/Commercialization Information

#### GREAT LAKES NATIONAL PROGRAM OFFICE - REMEDIATION

U.S. EPA, Region 5 Contracting Office, Chicago, IL  
Contract Opportunities at Beta.SAM, Solicitation 68HE0520R0004, 2021

This is a total small business set-aside under NAICS code 562910 (Environmental Remediation Services). The purpose of this IDIQ MATOC (multiple-award task-order contract) is to provide design-build and design-bid-build construction services for overall construction management and contaminated sediment remediation services in support of U.S. EPA's Great Lakes National Program Office sediment remediation efforts. Total value of all task orders awarded to all selected contractors under this MATOC will not exceed \$300M. Each base contract will be awarded as a 5-year ordering period with no options. See details on FedConnect at <https://www.fedconnect.net/FedConnect?zloc=68HE0520R0004&agency=EPA>. Offers are due by 4:30 PM ET on February 15, 2021. <https://beta.sam.gov/opp/rh67e70141b4d1c194d9e3a8aa1a5c7jwv>

#### CHEMICAL BIOLOGICAL OPERATIONAL ANALYSIS (CBOA) 2021

Defense Threat Reduction Agency, Fort Belvoir, VA.

This request for information is issued solely for planning purposes to gain information leading to Government/Industry partnering to accelerate the development of technologies that will enable the Warfighter to assess, protect and mitigate chemical, biological and radiological threats. The current goal is to identify developmental technologies for participation in a scenario-based Chemical Biological Operational Analysis event at Joint Expeditionary Base Little Creek-Fort Story, VA, during May 24-28, 2021. The CBOA event will gather representatives from Government R&D organizations, academia, and industry to provide an opportunity for technology developers to interact with operational personnel and determine how their efforts might support military capability gaps. The event is designed to facilitate a collaborative working relationship among participants; support the identification, assessment, and dissemination of emerging and mature technology information; and accelerate the delivery of capabilities. Among the many areas of interest for real-time response are the following: (1) non-specialist screening tools that detect the presence of key chemical/biological agents, toxic industrial chemicals, pharmaceutical-based agents, and radiological intelligence indicators, and (2) integration of CBR-centric sensing and detection capability with "all-source" information receptors and collectors. Responses are due by 5:00 PM ET February 19, 2021. <https://beta.sam.gov/opp/11c21934d28e14017a5c9721c1456e7b/view>

#### HAZARDOUS TOXIC AND RADIOACTIVE WASTE (HTRW) ARCHITECT-ENGINEERING SERVICES CONTRACT

U.S. Army Corps of Engineers, New England District, Concord, MA.  
Contract Opportunities at Beta.SAM, Solicitation W912WJ21X0013, 2021

The USACE New England District is issuing a sources sought notice for hazardous, toxic and radioactive waste (HTRW) IDIQ architect-engineering services to determine the interest, availability, and capability of 8(A), HUBZone, service-disabled veteran-owned, woman-owned, and small business concerns to perform the work. The NAICS code is 541330, size standard \$16.5M. All A-E contracts are now defined as multiple-award task-order contracts (MATOCs) consisting of a pool of a minimum of three A-E firms issued from a single solicitation. The proposal for the HTRW IDIQ A-E contract is to award to a pool of firms consisting of a mix of large and small businesses. The intent is to award up to 9 contracts with a total contract value between \$65M to \$75M. Work performed under this contract shall be mainly in the six New England states (ME, NH, VT, MA, CT, and RI) but will also include all other states and districts covered by the USACE North Atlantic Division's mission areas (NY, PA, NJ, DE, MD, VA, WV, and DC). The work involves performing investigations, feasibility studies and/or remedial designs at HTRW sites that are being addressed through EPA's Superfund Program, DoD's Base Realignment and Closure Program, the USACE's Formerly Used Defense Sites Program, and for other interagency support customers. Capabilities statements and industry feedback are due by 2:00 PM ET on February 22, 2021. Release of the solicitation is anticipated in summer 2021. <https://beta.sam.gov/opp/ea18166e2f1b4e8e9da94d84c34b243d/view>

#### PORTABLE GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)

Joint Product Manager, Chemical, Biological, Radiological, Nuclear and Explosive Analytics and Response Systems (JpDM CBRNE A&RS), Aberdeen Proving Ground, MD.  
Contract Opportunities at Beta.SAM, Solicitation: GCMS, 2021

The JpDM CBRNE A&RS at Aberdeen Proving Ground, MD, is conducting market research to identify candidate portable field GC/MS systems that will work within environmental conditions. The technology must have the following capabilities: (1) Rapid detection and identification of chemical hazards (e.g., chemical warfare agents and toxic industrial chemicals). (2) Analyze and detect targets combined in a complex environmental sample (solid, liquid, vapor, aerosol). (3) Sensitive, specific identification. (4) Quantifies agent/compound present. (5) Incorporates auto calibration. (6) Windows 10 compatible. (7) File interoperability and data sharing. (8) Uses NIST/EPA/NIH Mass spectral library of electron ionization spectra. (9) Uses customizable spectral libraries. (10) Performs headspace analysis and can utilize Depot Area Air Monitoring Systems tubes and SPME fibers. (11) Person portable (~40 lbs for the primary unit). (12) Operates in an austere environment under various temperatures and humidity levels. (13) Supportable for at least 7 years. All sources that are able to provide technologies meeting criteria in this announcement are invited to respond by 5:00 PM ET on February 26, 2021. The applicable NAICS codes for this RFI are 334516, 541714 and 541715. <https://beta.sam.gov/opp/9a3b4d0f75e4d6bbb130a565a698b7/view>

#### REAC CONTRACT SCIENCE & ENGINEERING SERVICES

U.S. EPA, Region 3 Contracting Office, Philadelphia, PA.  
Contract Opportunities at Beta.SAM, Solicitation 68HE0321R0002, 2021

U.S. EPA's Environmental Response Team (ERT) provides scientific and engineering services in support of the Superfund program under the Office of Land and Emergency Management, including support for regional on-scene coordinators and remedial project managers via the Response, Engineering, & Analytical Contract (REAC) in the removal and remedial programs, respectively. ERT also provides support in cases of national emergencies, such as oil spills, wildfires, hurricanes and floods. The NAICS code for the REAC is 541620. See details on FedConnect at <https://www.fedconnect.net/FedConnect?zloc=68HE0321R0002&agency=EPA>. Offers are due by 4:30 PM ET on March 1, 2021. <https://beta.sam.gov/opp/1562e23769b2499d8b7b3c4f5547a7b93jwv>

### Cleanup News

#### FROM AUTO SALVAGE TO ANIMAL CARE CENTER: MTBE REMEDIATION LEADS TO SITE REDEVELOPMENT

Finneran, K. and H. Nichols. | National Ground Water Association Groundwater Week, 8-11 December, virtual, abstract only, 2020

Soil and groundwater at a former auto salvage yard in Queens, New York, was contaminated with petroleum-related compounds and MTBE [4,300 mg/L]. Following excavation of the source of soil contamination, in situ groundwater treatment was designed to remediate MTBE for proposed future use of the site as an animal shelter and care center. Treatability studies were conducted for in situ chemical oxidation (ISCO) and aerobic bioremediation, using site soil and groundwater. The ISCO treatability study tested sodium persulfate and modified Fenton's reagent (MFR) and showed that MFR achieved the highest MTBE removal (99%). The aerobic bioremediation treatability study tested MTBE degradation using combinations of oxygen, nutrients, and a microbial culture and showed that adding a microbial culture while maintaining aerobic conditions resulted in a 95% MTBE removal rate. A two-phased treatment plan consisting of an initial MFR ISCO treatment and long-term biosparging treatment. One month following the March 2020 MFR injection, groundwater sampling results showed ~84% reduction in MTBE concentrations in the source area well.

#### LESSONS LEARNED FROM USING HRSC AT LUST SITES

Sohl, J., D. Malaier, and A. Thrash. NEIWPCC Webinar (121 minutes), 95 slides, 24 June 2020

This webinar analyzes data from 150 different leaking underground storage tank sites across the country that were investigated using high-resolution site characterization (HRSC). The presentation explains lessons learned from these sites as well as limitations and recommendations on how to use this data to make remediation decisions. LUST program managers in Alabama and South Carolina also share their lessons learned from using HRSC. <https://www.youtube.com/watch?v=x58ufgCawU8>

Slides only: [https://neiwpc.org/wp-content/uploads/2020/06/HRSC\\_Full.pdf](https://neiwpc.org/wp-content/uploads/2020/06/HRSC_Full.pdf)

#### PFAS TREATMENT AND INVESTIGATION AT A FORMER CHROMIUM PLATING FACILITY - A CASE STUDY

Hoare, B. | Midwestern States Environmental Consultants Association Virtual Environmental Conference, 2-3 and 9-10 December, abstract only, 2020

Past releases of process solutions and waste-treatment residuals from a former chrome plating facility caused elevated concentrations of hexavalent chromium (Cr<sup>6+</sup>) and nickel (Ni) in site soil and groundwater. To address contamination, groundwater had been continuously pumped from four extraction wells for treatment at the Kalamazoo POTW. Samples from the outfall at the former plating facility and identified PFOS concentrations in excess of 8,000 ng/L. As a result, the groundwater extraction system was shut down in June 2018. An emergency carbon and ion exchange PFAS treatment system was installed (functional within one month) for the existing extraction well network to treat PFAS from the effluent and address challenges of matrix interference from the Ni and Cr<sup>6+</sup>, sequestrants from the former plating process, and solids from the groundwater. See presentation by B. Hoare, N. Whitmyer, and D. Ham from 2019 Great Lakes Environmental Remediation & Redevelopment Conference: [https://www.michigan.gov/documents/agle/agle-101-gl-EER/epresentation-PFAS-ChromePlating\\_Hoare\\_671440\\_7.pdf](https://www.michigan.gov/documents/agle/agle-101-gl-EER/epresentation-PFAS-ChromePlating_Hoare_671440_7.pdf)

#### RECENT TRENDS IN IN-SITU HYDROCARBON REMEDIATION - TREATMENT WITH ACTIVATED CARBON REMEDIAL FLUID

Herrington, T. and A. Punsoni. | Environmental Services Association of Alberta (ESAA) Weekly Webinar Series, 41 slides, 19 May 2020

Slide presentation includes three case studies describing the use of PetroFix™, a solid sorbent suspended in an aqueous liquid, to treat petroleum hydrocarbons (BTEX, TPH-G, TPH-D, MTBE, naphthalene, etc.) in groundwater. PetroFix involves the patented use of micro-scale activated carbon and contains nitrate and sulfate electron acceptors. Treatment occurs through a combination of in situ sorption and in situ enhanced bioremediation. <https://www.esaa.org/wp-content/uploads/2021/01/14/14-Regenesis.pdf>

For more information on the Scott AFB site, see <https://iregenesis.com/wp-content/uploads/2019/02/Scott-AFB-2020-04-16-02.pdf>

#### SHORELINE REMEDIATION OF PETROLEUM HYDROCARBONS USING AN OLEOPHILIC BIO-BARRIER FOR SHEEN CONTROL

Gentry, J., T. Simpkin, and L. Tochno. | Environmental Services Association of Alberta (ESAA) Weekly Webinar Series, 40 slides, 21 May 2020

Slide presentation includes three case studies describing the use of oleophilic bio-barrier (OBB) to manage petroleum hydrocarbon sheens occurring at the groundwater/surface water interface due to releases of petroleum liquids. OBBs are multi-layer (structural cover, geotextile, clean sand fill, and geocomposite) constructions placed over sheens or retaining walls to block the NAPL or sheens and treat the petroleum hydrocarbons through aerobic biodegradation. Biodegradation is enhanced by cycling of surface water, which rejuvenates the geocomposite. Case studies of applications on a shoreline and at a retaining wall are presented as well as a case study highlighting remote application in Alaska. <https://www.esaa.org/wp-content/uploads/2021/01/14/14-Regenesis.pdf>

### Demonstrations / Feasibility Studies

#### MASS-BASED, FIELD-SCALE DEMONSTRATION OF PFAS RETENTION WITHIN AFFF-ASSOCIATED SOURCE AREAS

Adamson, D.T., A. Nickerson, P.R. Kulkarni, C.P. Higgins, J. Popovic, J. Field, A. Rodowa, C. Newell, P. DeBlanc, and J.J. Kornuc.  
Environmental Science & Technology 54(24): 15768-15777(2020)

Concentration data obtained via a high-resolution sampling and analytical protocol were used to estimate the PFAS mass distribution in source and downgradient areas of a former firefighter

training area. The total PFAS mass present was ~222 kg, with 106 kg as PFAAs and 116 kg as polyfluorinated precursors. Zwitterionic and cationic PFAS represented 83% of the total precursor mass and were found primarily in the source and up/side-gradient areas (75%), likely due to preferential hydrophobic partitioning, electrostatic interactions, and diffusion into lower permeability soils. Based on the release history and the high percentage of precursors (primarily electrochemical fluorination-derived compounds), the estimated conversion rate of precursors to PFAAs was less than 2% annually. Eighty-two percent of the total PFAS mass was encountered in lower permeability soils, which limited the potential for advection and transformation. This contributed to a 99% decrease in the mass discharge rate at the far-downgradient plume (0.048 kg/yr compared to 3.6 kg/yr in the near-source area).

#### BIOAVAILABILITY ASSESSMENT IN ACTIVATED CARBON TREATED COASTAL SEDIMENT WITH IN SITU AND EX SITU POREWATER MEASUREMENTS

Yan, S., M. Rakowska, X. Shen, T. Himmer, C. Irvine, R. Zajac-Fay, J. Eby, D. Janda, S. Ohannessian, and D.D.Reible. | Water Research 185:116259(2020)

Passive sampling and bioaccumulation assessments were used to evaluate AquaGate+PAC™ and SediMite™ for remediating offshore PCB-contaminated sediment of Hunters Point Naval Shipyard. After 8 months, PCB tissue concentrations in the Macoma nasuta clam were reduced 75-80% in pilot amendment areas and 84-87% in non-pilot normalized tissues after 14 months confirming the amendments' effectiveness in reducing PCE bioavailability. In situ polydimethylsiloxane passive samplers showed that although activated carbon composite materials were placed at the surface, 80% reductions were observed to a depth of 16 cm after 8 months and up to 26 cm after 26 months in the AquaGate+PAC treatment area. Total PCB porewater concentrations in surface sediments (1-6 cm) were reduced by 89% (AquaGate+PAC) and 91% (SediMite) during final sampling. An evaluation of in situ and ex situ porewater measurements suggest that the bioaccumulation factor in the deposit-feeding clam is better estimated by equilibrium ex situ porewater measurements.

#### THE PROMISE AND PITFALLS OF IN-SITU CARBON IMMOBILIZATION OF PFAS - TWO CASE STUDIES FROM MICHIGAN

Mankowski, L. | PFAS: Beyond the Theoretical and What's Working Seminar, 27 Feb, Madison, WI, 38 slides, 2020

Performance monitoring testing was conducted for three pilot tests that involved in situ carbon-based stabilization of PFAS. Two pilot tests used biochars in the PFAS source area surrounding a former tannery. In one test area, Bioavailable Absorbent Media (BAM)-Ultra™ was injected into the saturated system. After 7 days, PFOS concentrations in groundwater declined by 19-96%. In the second test area, BAM-X™ biochar was separately mixed into a 10x10 ft area. At 7 days post-mixing, groundwater PFOS concentrations reduced by 97%. At an airfield site, PlumeStop® and PlumeStop Stout™ were injected into a co-located, low-level PCE plume downgradient of a former fire-training area. Two months post-injection, PFOS and PCE were not detected in downgradient groundwater. Neither amendment tested achieved homogenous distribution when delivered by injection. Performance monitoring is ongoing. Data have not yet demonstrated amendment effectiveness in stabilizing PFAS in soil or groundwater. However, the data will provide long-term, site-specific case studies for consideration in future feasibility studies to address PFAS. [https://cdm.yemas.com/aigo.org/resource/resmgr/documents/events/seminars/2020/wi\\_pfes\\_seminar/mankowski\\_len.pdf](https://cdm.yemas.com/aigo.org/resource/resmgr/documents/events/seminars/2020/wi_pfes_seminar/mankowski_len.pdf)  
More information on the Camp Grayling Airfield project: [https://responseteam.com/wp-content/uploads/2019/02/REGFGENESIS\\_Camp\\_Grayling\\_2020\\_10\\_19\\_01.pdf](https://responseteam.com/wp-content/uploads/2019/02/REGFGENESIS_Camp_Grayling_2020_10_19_01.pdf) and [https://www.michigan.gov/pfasresponse/0,9038,7-365-86511\\_82704\\_84182--,00.html](https://www.michigan.gov/pfasresponse/0,9038,7-365-86511_82704_84182--,00.html)

#### ENHANCED BIOREMEDIATION PILOT TEST QUARTERLY REPORT NO. 2: APRIL THROUGH JUNE 2020 OPERABLE UNIT 2 LOCKWOOD SOLVENT GROUNDWATER PLUME SITE BILLINGS, MONTANA

Tasman Geosciences, Inc on behalf of EPA Region 8 and Montana Department of Environmental Quality, 517 pp, 2020

A pilot test is being conducted to evaluate enhanced bioremediation (EB) as a downgradient groundwater treatment barrier system to treat VOCs to below Record of Decision (ROD) performance standards. The EOS100 vegetable oil concentrate was diluted with water to create an EVO solution. A significant decrease in PCE and an increase in cis-1,2-DCE concentrations indicate that reductive dechlorination of PCE is occurring in the treatment area and the area immediately downgradient. Low *Dehalococcoides* concentrations measured in groundwater samples suggest that complete reductive dechlorination of PCE and TCE is unlikely to occur under existing conditions, necessitating introduction of an enriched bioaugmentation culture. EPA and the Montana Department of Environmental Quality will use pilot test data to determine if EB is a suitable technology for full-scale implementation. <https://semspub.epa.gov/work/08/100008878.pdf>

### Research

#### REMOVAL OF POLY- AND PER-FLUORINATED COMPOUNDS FROM ION EXCHANGE REGENERANT STILL BOTTOM SAMPLES IN A PLASMA REACTOR

Singh, R.K., N. Multari, C. Nau-Hix, S. Woodard, M. Nickelsen, S.M. Thagard, and T.M. Holsen | Environmental Science & Technology 54(21):13973-13980(2020)

High- (~100 mg/L) and low-concentration (<1 µg/L) batch plasma reactors were used to degrade PFAS in ion exchange (IX) regenerant still bottom (SB) solutions. Numerous PFAS with a wide concentration range (~0.01-100 mg/L; total oxidizable precursors [TOP] ~4000-10000 mg/L) were detected in SB solutions. In the high-concentration plasma reactor, PFAS precursors and long-chain PFAAs (>6C for PFSAs and >8C for PFCAAs) decreased by >99.9% in 2 h, and short-chain PFAAs <6C for PFSAs and <8C for PFCAAs) decreased by >99% in 6 h. The low concentration plasma reactor was then used to remove additional PFAAs. Adding cetrimerium bromide decreased short-chain PFAA (other than PFBA) concentrations to below detection limits in 90 min. Overall, >99% of the TOP was removed during treatment. Fluorine recovery of 47-117% was obtained in six SB samples. Energy requirements for PFOS and PFOS treatment from SBs ranged from 380-830 kWh/m<sup>3</sup>.

#### COMBINING CHEMICAL AND BIOLOGICAL OXIDATION FOR SUSTAINABLE TREATMENT OF CHLORONITROBENZENE IN ANOXIC GROUNDWATER

Amiri, S., A.J. Hanson, N.E. Pica, E.E. Mack, and J. Blotvogel. Groundwater Monitoring & Remediation [Published online 3 January 2021 prior to print]

An electrochemical advanced oxidation process (AOP) was applied to elucidate the degradation pathways and kinetics of chloronitrobenzenes (CNBs) under varying treatment conditions and times. Non-targeted mass spectrometry revealed multiple ring hydroxylation and ring opening products, such as dicarboxylic acids, that became increasingly harder to chemically oxidize as treatment time progressed. AOP-treated water samples collected at different stages of electrochemical oxidation were exposed to a microbial culture derived from generic rhizosphere soil to determine the universal biodegradability of the generated intermediates under anoxic conditions. All ring opening products were completely biodegraded anaerobically within 28 days of microcosm incubation. While multiple oxygenated ring intermediates were substantially removed, CNB was stable in the absence of oxygen. Findings demonstrated that combining limited and targeted chemical oxidation with subsequent biodegradation of incomplete oxidation products is a more sustainable approach than AOPs alone to treat groundwater contaminated with CNBs and likely other aromatic compounds.

#### FLUORINATED PRECURSOR COMPOUNDS IN SEDIMENTS AS A SOURCE OF PERFLUORINATED ALKYL ACIDS (PFAA) TO BIOTA

Langberg, H.A., G.D. Bredveld, G.A. Slinde, H.M. Gronning, A. Hoisaeter, M. Jartun, T. Rundberget, B.M. Jenssen, and S.E. Hale. Environmental Science & Technology 54(20): 13077-13089(2020)

The environmental behavior of PFAAs and their precursors was investigated in Lake Tyrifjorden, which lies downstream of a factory that produces PFAS-coated paper products. Low concentrations in water with respect to biota resulted in a high bioaccumulation factor. Sediment concentrations were high, particularly for the PFOS precursor SamPAP diester. Biota-sediment accumulation factors were comparable to elsewhere. Concentrations of PFAA precursors and long-chained PFAA in biota were positively correlated to the ratio of <sup>13</sup>C: <sup>12</sup>C, indicating positive correlations to dietary intake of benthic organisms. The sum fluorine from targeted analyses accounted for 54% of the extractable organic fluorine in sediment and 9-108% in biota. This, and high trophic magnification factors, suggest that hydrophobic precursors in sediments undergo a transformation and are a main source of PFAA accumulation in top predator fish. Due to the combination of water exchange and dilution, the transformation of larger hydrophobic precursors in sediments can be a source to PFAA, some of which are normally associated with uptake from water.

#### SIMULTANEOUS REMOVAL OF TRIVALENT CHROMIUM AND HEXAVALENT CHROMIUM FROM SOIL USING A MODIFIED BIPOLAR MEMBRANE ELECTRODIALYSIS SYSTEM

Liu, Y., X. Ke, X. Wu, C. Ke, R. Chen, X. Chen, X. Zheng, Y. Jin, and B. Van der Bruggen. Environmental Science & Technology 54(20): 3304-3313 (2020)

A modified bipolar membrane electrodialysis system equipped with a "back-to-back" soil compartment was fabricated to simultaneously remove Cr(III) and Cr(VI) from contaminated soils. The soil solution pH was shown to have a significant effect on desorption. Current density had an obvious effect on removal, cell voltage, soil pH, current efficiency, and specific energy consumption. The optimal current density was 2.0 mA/cm<sup>2</sup>. Removal efficiencies of Cr(III) and Cr(VI) were both 99.8%. Cr(III) and Cr(VI) recoveries were somewhat lower at 87 and 90%, respectively, because the membranes adsorbed some Cr(III) and Cr(VI). Based on an energy consumption analysis, the system was shown to increase the current efficiency and decrease the specific energy consumption. When a system equipped with two back-to-back soil compartments was used, the current efficiency increased to 28.8%, and the specific energy consumption decreased to 0.048 kWh/g. Results indicated that the proposed process is a potentially effective technique to treat soil contaminated with heavy metals.

#### COMBINING CHEMICAL OXIDATION AND BIOREMEDIATION FOR PETROLEUM POLLUTED SOIL REMEDIATION BY BC-NZVI ACTIVATED PERSULFATE

Zhang, B., Y. Guo, J. Huo, H. Xie, C. Xu, and S. Liang. Chemical Engineering Journal 382:123055(2020)

Verification of treatment of TPH-polluted soil using a 15% persulfate (PS, w/w) concentration combined with biochar-supported nano zero-valent iron (BC-nZVI) was conducted in a 60-day period. The results were compared to TPHs underwent chemical degradation (days 0-6) followed by biodegradation (days 6-60). The carbon chain transformation was tested to clarify the degradation process during remediation. Within 60 days, long-chain TPHs were constantly degraded and transformed into short-chain molecules in the BC-nZVI/PS treatments. Compared with nZVI/PS, BC-nZVI/PS increased soil microbial metabolic activities during the remediation period. Microbial analysis showed that the PS activation groups could significantly affect microbial abundance and structure. The microbial abundance recovered in BC-nZVI/PS groups, and TPH-degrading bacterium increased over the treatment period.

#### APPLICATION OF COMBINED CHEMICAL OXIDATION AND MICROWAVE TREATMENT FOR HYDROCARBON-CONTAMINATED SOIL FROM AN URBAN OIL SPILL SITE

Sivagami, K., B. Rajasekhar, S. Mujahed, I.M. Nambi, and A.K. Rajan. Journal of Hazardous, Toxic, and Radioactive Waste 25(2)(2020)

This study evaluated the feasibility of treating diesel-contaminated soil excavated from a metro rail construction site in Chennai, India, using a combined chemical oxidation and microwave (MW) heating technique. TPH concentrations varied from 12,900-13,550 mg/kg. Under optimized conditions of 450 W power and a 60 min treatment time, MW plus a 2.5 wt% dose of hydrogen peroxide improved TPH degradation efficiencies in three samples by 23.82%, 17.36%, and 20.89%, compared with MW heating alone. Results could be used to design and scale-up the technology to remediate the site.

#### MULTIPHASE EXTRACTION RADIUS OF INFLUENCE: EVALUATION OF DESIGN AND OPERATIONAL PARAMETERS

Crawford, R. C.Q. Surbeck, S.B. Worley, and H.Q. Parker Capps. Remediation 22(4):37-48(2020)

Multiphase extraction operational data were studied from nine similar remediation projects to determine the most important design parameters. Design equations from guidance manuals were used to estimate the expected radius of influence (ROI) based on measured field data. ROIs were calculated for the vapor flow rate through the subsurface and the groundwater drawdown caused by the MPE remediation activities. The calculated ROIs were compared to the measured ROIs to corroborate the assumptions made in the calculations. Once it was established that the calculated and field-measured ROIs were comparable, a sensitivity analysis determined ranges of different design and operational parameters that most affected the ROIs.

#### BIOMASS AND PHYTOEXTRACTION POTENTIAL OF THREE ORNAMENTAL SHRUB SPECIES TESTED OVER THREE YEARS ON A LARGE-SCALE EXPERIMENTAL SITE IN SHANGHAI, CHINA

Shang, K., Y.H. Hu, G. Vincent, and M. Labrecque. International Journal of Phytoremediation 22(1):10-19(2020)

*Hibiscus mutabilis*, *Hibiscus hamabo*, and *Senna corymbosa* were tested in a large experimental design (2000 m<sup>2</sup>) over three growing seasons in soils spiked with Cu, Pb, or Zn salts. Each year of the study, biomass was harvested and analyzed for all plants. Despite the relatively high concentration of metals in plots, no signs of toxicity were observed. Concentrations of metals in root tissues were generally much higher than those found in aerial parts. The bioconcentration factor values were generally very low, but the high biomass yield produced by *H. mutabilis* led to significant removal of Cu and Zn. No difference in the quantity of Pb extracted was found between species. As these plants respond well to coppicing, it may be possible to gradually eliminate contaminants from soils. Their use can also embellish the landscape while generating many other ecological services.

## General News

### TECHNICAL RESOURCES FOR VAPOR INTRUSION MITIGATION

Interstate Technology & Regulatory Council (ITRC) Vapor Intrusion Mitigation Team, Report No: VIM-1, 2021

ITRC has developed nine fact sheets and one technology information sheet for emerging technology to summarize the latest science, practices, and new approaches for vapor intrusion mitigation. The documents are designed for state and federal environmental staff, and others (including stakeholders, project managers, and decision-makers), to gain a working knowledge of vapor intrusion and practice. While every effort was made to keep the information accessible to a wide audience, it is assumed the reader has some basic technical background in chemistry, environmental sciences, risk assessment, and vapor intrusion.

**Web-based document:** <https://vim-1.itrcweb.org/>

**PDF:** <https://vim-1.itrcweb.org/wp-content/uploads/2021/01/VIM-PDF-FINAL.pdf>

### BIOLOGICAL NATURAL ATTENUATION AND CONTAMINANT OXIDATION IN SEDIMENT CAPS: RECENT ADVANCES AND FUTURE OPPORTUNITIES

Pagnozzi, G., S. Carroll, D.D. Reible, and K. Millerick.  
Current Pollution Reports 6:281-294(2020)

Combining capping amendments with biodegradation is an emerging technology with the potential to promote simultaneous sequestration and oxidation of contaminants in situ. This review summarizes current literature documenting the impact of these alterations on microbial ecology and biodegradation activity, describes recent advances in bioactive sediment caps, and identifies areas where additional research is warranted.

### COLLOQUIUM REPORT: MICROBIAL GENOMICS OF THE GLOBAL OCEAN SYSTEM

Joye, S. and J.E. Kostka. American Society for Microbiology, American Academy of Microbiology, Gulf of Mexico Research Initiative, and Advanced Earth and Space Science, 56 pp, 2020

The Gulf of Mexico's microbial communities played a critical role in cleanup of the Deepwater Horizon disaster, contributing core hydrocarbon bioremediation services. The development and application of genomics and bioinformatics tools enabled researchers to identify and examine individual microorganisms within the Gulf's complex communities in unprecedented detail. Technical advances and new discoveries have revealed a natural capacity of microbes to catalyze petroleum hydrocarbon bioremediation. This knowledge is critical to guiding mitigation and restoration strategies that build on microbes' natural bioremediation capabilities without further disturbing sensitive ecosystems. The report highlights new research tools, methodology, data resources, collaborations, and models to advance basic and applied research to provide data-driven solutions to environmental challenges.

<https://www.asmscience.org/dorserver/fulltext/microbial-genomics.pdf?expires=1611937524&id=id&arcname=guest&checksum=4D9806C4093428DE3A134C5FE3290913>

### SYSTEM ASSESSMENT AND VALIDATION FOR EMERGENCY RESPONDERS (SAVER): DOCUMENT LIBRARY

U.S. Department of Homeland Security (DHS), Science and Technology Directorate, National Urban Security Technology Laboratory (NUSTL), 2021

The DHS National Urban Security Technology Laboratory manages the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders in making procurement decisions. Since its inception in 2004, the SAVER Program has assessed hundreds of emergency response technologies, and more than 1,000 emergency responders—law enforcement officers, firefighters, paramedics, and emergency managers—have participated in those assessments. The knowledge products, which include focus group, market survey, and assessment reports; technical notes; application notes; handbooks; guides; and other documents, are described in detail on the SAVER Document Descriptions page.

<https://www.dhs.gov/science-and-technology/saver-documents-library>

### FIELD PORTABLE GAS CHROMATOGRAPH MASS SPECTROMETERS ASSESSMENT REPORT

SAVER-T-R-24, 35 pp, Feb 2020

Under the Department of Homeland Security's System Assessment and Validation for Emergency Responders (SAVER) Program, the National Urban Security Technology Laboratory based this report on information obtained from an operationally oriented assessment of field-portable gas chromatograph mass spectrometers (GCMS). The report covers three GCMS units: FLIR Detection, Inc./Griffin G-510, PerkinElmer/Torion T-9, and Inficon AG/Hapsite E. The instruments were evaluated on 30 criteria in four SAVER assessment categories: capability, deployability, maintainability and usability. <https://www.dhs.gov/science-and-technology/saver/field-portable-gas-chromatograph-mass-spectrometer-gcms>

### HANDHELD EXPLOSIVES TRACE DETECTORS ASSESSMENT REPORT

SAVER-T-R-22, 41 pp, Sep 2020

In collaboration with the Department of Homeland Security's Transportation Security Laboratory, the National Urban Security Technology Laboratory conducted a comparative assessment of handheld explosives trace detectors to provide emergency responders with information on currently available equipment. The operational assessment addressed 22 evaluation criteria in four categories: capability, deployability, maintainability, and usability. Four units are discussed: FLIR Detection Inc./Fido® X3, Rapiscan Systems/MobileTrace®, Bruker Detection/ Corporation RoadRunner, and Smith's Detection/Sabre® 5000. These detectors can be operated in swipe or vapor sampling modes.

<https://www.dhs.gov/science-and-technology/saver/handheld-explosive-trace-detectors>

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