Entries for June 1-15, 2025

Market/Commercialization Information

9 CES FUEL SPILL CLEANUP (COMBINE)
U.S. Department of the Air Force, Air Combat Command, Nellis AFB, NV
Contract Opportunities on SAM.gov F3G3CE5147A002, 2025

This is a total small business set-aside under NAICS code 562910. The U.S. Department of the Air Force Air Combat Command requires a contractor to clean up hazardous waste, including containment, cleanup, and disposal of contaminated materials located on the Airfield at Nellis AFB in Nevada. The contractor shall remove fuel-contaminated asphalt patches (150' X 4') and remove fuel-contaminated soil Area: 25' X 20' to a depth of 6' or with concentrations of hazardous substances or petroleum substances that exceed soil action levels listed in NAC 445A.2272. All contaminated soil shall be segregated and placed in designated containers for transport to a designated landfill or treatment facility approved by both the EPA and NDEP. The Civil Engineering Squadron will be responsible for replacing the soil that was removed. The award will be a firm-fixed-price contract with a 60-day period of performance. Offers are due by 10:00 AM PDT on July 25, 2025.
https://sam.gov/opp/b96ddbaf1e6d445b9ac5716edfe09494/view

NTCRA AT PINHOOK BOG, INDIANA DUNES NP, IN (SOL)
U.S. Department of the Interior, National Park Service, Washington Contracting Office, Lakewood, CO
Contract Opportunities on SAM.gov 140P2125R0039, 2025

This is a service-disabled veteran-owned small business (SDVOSB) set-aside under NAICS code 562910. The U.S. Department of the Interior, National Park Service, requires a contractor to conduct a removal action under CERCLA at the Pinhook Bog Unit of the Indiana Dunes National Park (INDU) near La Porte, Indiana. The work requires the removal of sufficient material to reach the site's removal action objectives. The work includes removing approximately 1,350 bank cubic yards (BCY, ~2,500 tons) of solid waste and commingled soil (some of which is contaminated and may be classified as hazardous), characterizing the material, transporting it to appropriate disposal facilities, collecting and analyzing confirmation samples, and preparing a Removal Action Completion Report. The estimated removal quantities are based on previous site investigations. This firm-fixed-price contract will use a combination of lump sum and unit-priced items subject to the variation in quantity clause in conjunction with an established ceiling and notification requirements. The period of performance is 430 calendar days after the Notice to Proceed. Offers are due by 11:00 PM PDT on August 11, 2025. https://sam.gov/opp/eb6fad05c9e1467a860c05a5496c23e7/view

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Cleanup News

DECOMMISSIONING & EXIT STRATEGIES FOR ACTIVE AND PASSIVE VAPOR INTRUSION MITIGATION SYSTEMS
Szocinski, T.R. | 34th Annual International Conference on Soil, Water, Energy, and Air, 17-20 March, San Diego, CA, 13 slides, 2025

This presentation reviews the decommissioning and/or exit strategy for both active and passive vapor intrusion mitigation systems (VIMS). It includes two case studies (an active methane mitigation system and a passive VIMS) and the step-down process for moving from active to passive treatment, while reducing and eventually discontinuing sampling/monitoring events. Inconsistent regulations and guidance among jurisdictions, as well as the absence of decommissioning guidance, pose challenges to VIMS practitioners. A decision matrix/flow chart is used to show a potential navigational process for VIMS projects. ITRC VI guidance and regulations, and guidance from trendsetting states are used to guide the decision-making discussions. The presentation also considered the advantages and disadvantages of continuing to operate VIMS systems after objectives have been achieved and/or operating without a defined exit strategy.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File25469/PresentationPDF_131_0324011332.pdf

IN-SITU REMEDIATION WITH COLLOIDAL ACTIVATED CARBON TO REDUCE PFAS RISK
Nunez, D. | 34th Annual International Conference on Soil, Water, Energy, and Air, 17-20 March, San Diego, CA, 36 slides, 2025

This presentation features case studies highlighting the use of colloidal activated carbon's (CAC) effectiveness in preventing PFAS migration and exposure. Independent modeling studies demonstrate the long-term efficacy of using CAC in situ to treat PFAS-contaminated groundwater, potentially offering a permanent solution for both source and dissolved plumes. A life cycle assessment completed for a PFAS-impacted airport site demonstrates how in situ remediation with CAC was implemented at one-third the cost and with a >98% lower carbon footprint than the leading pump-and-treat alternative.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File25469/PresentationPDF_142_0316111318.pdf

PUMP AND TREET - PUSHING THE LIMITS OF SUSTAINABLE REMEDIATION PRACTICES
Corklin, K. | 34th Annual International Conference on Soil, Water, Energy, and Air, 17-20 March, San Diego, CA, 38 slides, 2025

This presentation reviews case studies where innovative sustainable remediation methods were successfully applied, showcasing how these approaches can be adapted to diverse challenges and offering valuable insights for future advancements in the field.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File25469/PresentationPDF_303_0324032903.pdf

WORKSHOP 02: EXTRACTION AND INJECTION METHODS FOR CHLORINATED AND RECALCITRANT COMPOUNDS: APPLICATIONS AND ENHANCEMENTS FOR GROUNDWATER AND SOIL REMEDIATION
Pehlivan, M., J. Depa, 34th Annual International Conference on Soil, Water, Energy, and Air, 17-20 March, San Diego, CA, 38 slides, 202

This four-hour remediation workshop provided attendees with an understanding of how remediation systems involving extraction or injection work in the subsurface and how to optimize the methods for maximum efficiency. The workshop covered site conceptual model development; efficient collection and analysis of assessment and remediation data; 3D visualization of assessment and remediation data; how 3D visualizations can be used to optimize remedial design; electronic field data collection, analysis, and reporting; and remediation progress evaluation. Extraction methods covered included vacuum-driven extraction methods, soil vapor extraction (SVE), two-phase extraction (TPE), dual-phase extraction (DPE), and multi-phase extraction (MPE), SVE/TPE/MPE. Applications, including how to use pore-volume based ROI calculations, setting up low flow, low-vacuum SVE/SSD system using solar power source, how to monitor in-situ bioremediation during SVE, intermittent or continuous operation, estimating rebound time, designing a drop tube for maximum water and vapor flow, and water lift for two-phase extraction and in-well stripping are also discussed. In-situ injection methods covered include ISCO, EISB, ZVI injection, calculating the in situ mass of contaminants, estimating dosages, implementing advanced site characterization tools, 3D statistical modeling to optimize remediation design, and pre/during/post-injection monitoring. Several case studies are reviewed to discuss which remediation amendments worked, what did not work, and the reasons why. An overview of PFAS remediation alternatives were also covered, including IX, GAC, reverse osmosis, SCWO, and other emerging remediation methods. Case studies were presented for each remediation alternative.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File25469/PresentationPDF_127_0316022431.pdf

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Demonstrations / Feasibility Studies

FIELD DEMONSTRATION OF IN SITU STABILIZATION (ISS) OF PER- AND POLYFLUOROALKYL SUBSTANCES IN SOIL WITH REMBIND®
Divine, C., L. Melicharek, D. Gomes, K. Heinze, J. Erickson, B. Barker, D. Liles, A. Baumeister, E. Foote, J. Aust, T. Dugan, M. Wells, and S. Bayer. SSRN [Published 30 April 2025 before peer review and print]

A field study was completed to assess the effectiveness of in situ soil stabilization (ISS) to immobilize PFAS-impacted soil, including PFOS and PFOA. RemBind 100X was applied in a former burn pit at 3% dw as a stabilizing material to impacted soil to reduce PFAS leaching. The fixant was distributed and mixed over a 3-ft vertical zone across a 100 x 100 ft area gridded into 18 test cells. Performance monitoring events completed throughout 19 months included collecting soil samples to assess PFAS leaching using Leaching Environmental Assessment Framework analysis and monitoring vadose zone moisture. Leachate concentrations were reduced for all PFAS by at least 95% and were measured at levels less than EPA's regional screening levels and maximum contaminant levels for PFOS, PFOA, PFBA, PFBS, PFNA, PFHxA, PFHxS, and hexafluoropropylene oxide dimer acid (HFPO-DA). The approach was effective at reducing leaching from the stabilized soils, while still allowing infiltration of precipitation.
https://papers.ssrn.com/sol3/Delivery.cfm/4e2e1283-38f6-41ae-bbc8-d44527f3d5ae-MECA.pdf?abstractid=5237046&mirid=1&type=2

AMENDMENT EFFECTIVENESS AND SEASONAL VARIATIONS IN A LEAD CONTAMINATED ACIDIC WETLAND
Noerpel, M.R., A.M. Wade, A.R. Betts, J. Goetz, R. Ford, A. Krause, M. Zeolla, D. Cutt, S. Wilson, and T.P. Luxton. Applied Geochemistry 185:106396(2025)

The Burnt Fly Bog Superfund site is located at the northern end of the New Jersey Pine Barrens on the Atlantic Coastal Plain, containing both wetland and pine-oak forest ecosystems. The 60-acre site was contaminated by waste oil storage lagoons that overflowed into undeveloped wetlands, releasing waste oil, PCBs, and lead (Pb) downgradient from the lagoons and contaminating the top 6-12 inches of soil with percent level concentrations of Pb in the wetlands and forest soils. The site has been undergoing remediation since the 1980s, with the most contaminated sections, where the waste lagoons were located, remediated through immediate removal actions, capping, and a sedimentation basin constructed at the downstream end of the site to prevent surface contaminants from moving offsite. Three in situ Pb soil amendment treatment methods were tested over 26 months in a naturally acidic contaminated wetland to sequester high levels of Pb contamination as stable mineral forms. Two treatments used Apatite II to promote the formation of pyromorphite. One treatment was surface applied, while the other was physically mixed into the surface soil. The third treatment, a sulfate-rich compost-based mixture, was applied to promote the formation of galena. Amendment effectiveness was evaluated by comparing Pb porewater concentrations between treatments and changes in the speciation of sediment Pb as determined by X-ray absorption spectroscopy (XAS). Results show that the dissolved Pb concentrations did not have a significant impact on Pb mobility and speciation. Dissolved Pb concentrations did not decrease significantly compared to the control plots. Also, speciation analysis did not show evidence of pyromorphite formation in the phosphate-amended plots. This study shows that effective amendment treatments must account for site-specific characteristics such as pH and redox dynamics, and use appropriate preservation methods for accurate speciation results.

EVALUATING MINERAL AND IN SITU INDICATORS OF ABIOTIC DECHLORINATION IN CLAYEY SOILS
Charles E. Schaefer, Danielle Tran, Dung Nguyen, Drew E. Latta, Charles J. Werth
Groundwater Monitoring & Remediation 45(2):31-39(2025)

Tools to provide lines of evidence for reductive and oxidative dechlorination reactions and screening-level estimates of dechlorination rate constants that can be incorporated into site fate and transport models have not been widely accepted for clayey systems. In this study, coupled bench- and field-scale testing at nine locations within the saturated zone showed that measuring reduced gases in field-collected clayey samples was inconclusive for indicating in situ abiotic reductive dechlorination. However, using 1% (v/v) HCl extractions and X-ray diffraction for mineral composition provided information needed to estimate TCE abiotic reductive dechlorination in clays, thereby serving as a potential screening tool for site investigation. While a corresponding screening tool for estimating abiotic oxidative dechlorination in clay was not demonstrated, the rate of hydroxyl radical generation measured for each clay in batch experiments was correlated to in situ hydrogen peroxide concentrations measured in groundwater near the sand-clay interface. The observation provides a first line of evidence that ongoing reactive oxygen species generation is occurring in situ near the sand-clay (oxic-anoxic) interface, potentially serving as a means to facilitate abiotic oxidative dechlorination and mitigate back-diffusion of chlorinated solvents from clay.

A NON-REACTIVE GAS SYSTEM TO REDUCE WELL FOULING AND MAINTENANCE OF EXTRACTION WELLS
Petersen, B.B., S.M. Griffin, and H.A. Cohen.
Groundwater Monitoring & Remediation 45(2):56-64(2025)

A down-well, fouling-prevention system for groundwater extraction wells was designed, tested, and then implemented site-wide in extraction wells with a multi-decade history of chronic fouling at the former Bannister Federal Complex site in Kansas City, Missouri. The antifouling system creates an oxygen-deprived environment within the air column of the well through air displacement with a non-reactive gas. Oxygen removal from the air column inhibits both biological activity and certain chemical reactions associated with fouling and does not require the use of chemical treatments or manual scrubbing. After one year, chemical and biological fouling within the test wells was largely absent, whereas control wells undergoing chlorine treatment were heavily fouled and required rehabilitation.

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Research

MULTISCALE INSIGHTS INTO STRUCTURE-POROSITY INTERPLAY AND WATER ADSORPTION IN GRANULAR ACTIVATED CARBON FOR ENHANCED ELECTROCHEMICAL WATER TREATMENT
Taqieddin, A., S. Sarrouf, M.F. Ehsan and A.N. Alshawabkeh.
ACS ES&T Water [Published online 7 May 2025 before print]

A multiscale investigation combined molecular dynamics (MD) simulations, continuum-scale modeling, and experimental validation to understand how the granular activated carbon (GAC) structure influences water adsorption and reactivity. MD simulations show that highly porous GAC (porosity up to 0.55) adsorbs up to 1.2 kg of water/kg carbon, with an adsorption energy reaching 880 kJ/kg. Continuum modeling using the coupled level-set volume-of-fluid method demonstrates that high-porosity GAC reduces surface blockage by promoting bubble mobility. Experimental results confirm these findings: unpressed GAC electrodes (i.e., larger porosity) with a lower density (similar to 0.1997 g/cm^3) generated up to 180 ppm of hydroxyl radicals, compared to 100 ppm from pressed electrodes with equal mass. Findings indicate that optimizing GAC porosity and particle size enhances both water transport and reactive oxygen species generation, improving the treatment performance. This integrated modeling and experimental framework highlights structure-function relationships in GAC electrodes and informs the design of scalable, high-efficiency systems. The work focuses on water interactions with GAC, opening doors for future studies on pollutant-specific reactivity in the electrochemical water treatment system.

IDENTIFICATION OF POTENTIALLY TOXIC TRANSFORMATION PRODUCTS PRODUCED IN POLYCYCLIC AROMATIC HYDROCARBON BIOREMEDIATION USING SUSPECT AND NON-TARGET SCREENING APPROACHES
Huizenga, J.M., L. Semprini and M. Garcia-Jaramillo.
Environmental Science & Technology 59(15):7561-7573(2025)

This study utilized suspect and non-target screening approaches to identify PAH-transformation products (PAH-TPs) produced by *Rhodococcus rhodochrous* ATCC 21198 using liquid chromatography-high resolution mass spectrometry. Open-source tools were used to predict biotransformation products, predict potential PAH-TP structures from mass spectra, and estimate health hazards of potential PAH-TPs. The workflow developed tentatively identified 16 PAH-TPs (confidence levels 2a to 3), seven of which were not previously detected by targeted analysis. Several new potential transformation pathways for the bacterial pure culture were suggested by the PAH-TPs, including carboxylation, sulfonation, and up to three hydroxylation reactions. A computational toxicity assessment indicated that the PAH-TPs shared many hazard characteristics with their parent compounds, including genotoxicity and endocrine disruption, highlighting the importance of considering PAH-TPs in future PAH studies.

A NATIONAL EMPIRICAL ATTENUATION FACTOR STUDY TO IMPROVE VAPOR INTRUSION SCREENING
Lahvis, M.A. and R.A. Ettinger. | 34th Annual International Conference on Soil, Water, Energy, and Air, 17-20 March, San Diego, CA, 44 slides, 2025

This study involved the development of a large empirical database containing thousands of indoor air and subsurface soil gas data pairs collected across the U.S. The goal was to provide a comprehensive analysis of building-specific attenuation factors (AFs) to support technically defensible risk-based screening levels for vapor intrusion (VI). Site data contained in former databases were combined with new data contributed by several environmental consultancies and state regulatory agencies. The national database was used to derive AFs using descriptive statistics, reliability analyses, and theoretical AF versus subsurface soil gas concentration relations that account for background sources in indoor air. The effects of data pairing, source-strength filtering, and other key variables on the AF were evaluated. AFs derived from this study will benefit numerous stakeholders, including federal and state regulators, industry, redevelopers, environmental consultants, and the public, by providing AFs that are more applicable to the range of site conditions frequently encountered during VI screening.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File25469/PresentationPDF_188_0319015036.pdf

MODELING THE INFLUENCE OF COASTAL SITE CHARACTERISTICS ON PFAS IN SITU REMEDIATION
Carey, G.R., A. Danko, A.L.-T. Pham, K. Soderberg, B. Hoagland, and B. Sleep.
Groundwater 63(2):175-191(2025)

The potential performance of a hypothetical colloidal-activated carbon (CAC) in situ remedy for PFOA and PFOS in groundwater was evaluated using estimated hydrogeologic and geochemical parameters for a coastal site in the U.S. With these parameters, a reactive transport model assessed the effects of tidal fluctuations and near-shore geochemistry on CAC performance. The average near-shore ionic strength of 84 mM was conservatively estimated to result in an increase in PFOA adsorption to CAC by about 50% relative to non-coastal sites with ionic strength <10 mM. The modeling also confirmed the hypothesis that tidally induced groundwater flow reversals near the shore would result in the accumulation of PFOA at the downgradient edge of the CAC zone. Slow PFOA desorption from the downgradient CAC boundary may sustain

downgradient plume concentrations above a strict cleanup criterion (e.g., EPA MCL of 0.004 µg/L) for decades. However, there was still a large PFOA mass flux reduction (>99.9%) achieved after several decades at the shore. CAC longevity was substantially greater for PFOS with a similar source concentration; however, the higher PFOS distribution coefficient (K_d) in soil downgradient from the CAC zone resulted in substantially longer flushing times. It is recommended that short-term remedial action objectives for CAC remedies at coastal sites be based on mass flux reduction targets over several decades, given the demonstrated challenges in trying to achieve very low cleanup criteria downgradient of a CAC zone in the short term. https://ngwa.onlinelibrary.wiley.com/doi/epdf/10.1111/gwat.13456

EXTRACTABLE ORGANOFLUORINE MASS BALANCE ANALYSIS OF AQUEOUS FILM-FORMING FOAM-IMPACTED SOILS: SAMPLE PRETREATMENT AND A COMBINATION OF TARGET ANALYSIS AND SUSPECT SCREENING
Wang, Q., P. van Hees, P. Karlsson, E. Jiao, M. Filipovic, P.K.S. Lam, and L.W.Y. Yeung.
Environmental Science & Technology 59(15):7624-7633(2025)

Ten surface soil samples from three AFFF-impacted sites in Sweden were analyzed using alkaline extraction followed by acidic extraction. After being subjected to further cleanup, the alkaline and acidic fractions were analyzed separately for target, suspect screening, and extractable organofluorine (EOF) to evaluate the extraction efficiencies of different PFAS and reveal remaining PFAS in the impacted soil. Total target PFAS concentrations ranged from 33.0 to 2.40 × 104 ng/g dry weight. Thirty-six PFAS were identified using suspect screening. Considerable amounts of zwitterionic and cationic PFAS (up to 58%) were identified in the acidic extraction fraction, while >95% of anionic PFAS were found in the alkaline extraction fraction. EOF mass balance analysis was conducted on AFFF-impacted soil. The high proportion of unexplained organofluorine (up to 65%) indicated the necessity for future investigation of the unknown PFAS in AFFF-impacted soil to comprehensively understand their fate and risk.

MICROFLUIDIC STUDY ON GREEN REMEDIATION OF NONAQUEOUS PHASE LIQUID (NAPL) CONTAMINATION IN HETEROGENEOUS GROUNDWATER SYSTEMS USING DIHYDROLEVOCLUCOSENONE (CYRENE)
Wang, X., H. Zhao, T. Zheng, Y. Li, X. Wang, Q. Wang, T. Long, C. Tsakiroglou, and J. Luo.
Environmental Science & Technology 59(13):6850-6862(2025)

A study explored using the bioderived green solvent, dihydrolevoclucosenone (Cyrene), as an alternative to traditional treatments for NAPL remediation. Through microfluidic experiments and accompanying numerical modeling, Cyrene was demonstrated to enhance the dissolution and mobilization of NAPL contaminants, particularly in low-permeability zones, achieving residual NAPL reductions of up to 80% compared with water and Tween 80 solutions. Findings underscore Cyrene's dual environmental benefits as an eco-friendly solvent for both treating solid waste and for NAPL remediation, paving the way for sustainable and green solutions in environmental management.

A NEW IN SITU FRACTURING-ENHANCED OXIDATIVE REMEDIATION FOR VARIOUS LOW-PERMEABILITY PHENANTHRENE-CONTAMINATED SOILS: OXIDATION EFFECTIVENESS AND KINETICS OF POTASSIUM PERMANGANATE
Shi, F.-J., S.-J. Feng, J.-G. Niu, Q.-T. Zheng, and X.-L. Zhang.
Journal of Hazardous Materials 488:137335(2025)

A study evaluated the effects of permeability and potassium permanganate (KMnO4) concentration on the oxidation potential and kinetics of $KMnO_4$ in phenanthrene (PHE)-contaminated soil through rigid-wall hydraulic conductivity tests and a series of lab experiments. For various low-permeability contaminated soils, a critical $KMnO_4$ concentration existed that significantly reduces the remediation time, in addition to a critical Darcy velocity to achieve remediation goals. A systematic research method was proposed to obtain the optimal design parameters. Based on an equivalent batch test system, the reaction of KMnO4 migrating in the soil matrix between two adjacent parallel fracture layers followed piecewise first-order kinetics regardless of soil type. The piecewise judgment condition was a KMnO4 concentration ratio of exudate to infiltrate of 0.65. $KMnO_4$ oxidation significantly reduced the ecotoxicity of various PHE-contaminated soils but had little effect on other physicochemical properties.

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General News

U.S. GEOLOGICAL SURVEY KARST INTEREST GROUP PROCEEDINGS
Kuniansky, E.L. and L. Spangler (eds). USGS Open-File Report 2024-1067, 116 pp, 2024

Proceedings from the 2024 workshop held by the USGS Karst Interest Group (KIG) are documented in this report. The abstracts and extended abstracts provide a snapshot in time of past and current karst-related studies. https://pubs.usgs.gov/of/2024/1067/ofr20241067.pdf

IN SITU BIOELECTROCHEMICAL REMEDIATION OF CONTAMINATED SOIL AND GROUNDWATER: A REVIEW
Shao, G., J. Dong, W. Zhang, S. Sun, C. Li, and Y. Li.
Environmental Pollution 374:126250(2025)

This review provides the current status, challenges, and outlook of bioelectrical system (BES) in situ treatment of contaminants in soil and groundwater. It discusses the principles and efficacies of BES treatment; and the factors that impact BES treatment efficiencies, especially soil properties, and the distinctive and pivotal factors for BES in situ application. BES is a green and sustainable in situ remediation technology, and future advancements may necessitate the integration with complementary technologies and innovative system configurations for practical implementation.

STATE OF THE PRACTICE WORLDWIDE: DEVELOPING APPROACHES TO TRANSITION FROM ACTIVE REMEDIATION TO MONITORED NATURAL ATTENUATION
Adamson, D.T., H. Hort, J.T. Wilson, C.J. Newell, and T.E. McHugh.
Groundwater Monitoring & Remediation 45(2):65-80(2025)

A software tool (TA2 Tool) that aids in gathering and analyzing data relevant for a site-specific transition assessment was developed. The implications of site complexities in achieving remedial objectives are a key component of transition assessment. This free web-based tool has modules that perform quantitative assessment of concentration trends and project the remediation timeframe based on the current remedial approach. It includes modules that predict how remediation timeframes are influenced by matrix diffusion to assess if additional remediation is warranted. It also includes modules that evaluate MNA as a transition technology, specifically by looking at plume stability, natural attenuation rates, and projections of plume concentrations at a downgradient point of compliance in the absence of further active treatment. This new tool complements existing resources on technology optimization and transitions, including ITRC guidance. The value of performing these types of assessments is highlighted through empirical data and case studies that show that it is not necessary to operate pump-and-treat systems in perpetuity and that many sites with these systems have either transitioned to other technologies or been closed.

DEVELOPMENT OF A NOVEL LOW-COST AUTOMATED FLUX CHAMBER FOR REAL-TIME MONITORING OF VOCS EMISSIONS AT CONTAMINATED SITES
Tonolo, N., A. Cecconi, S.M. Vuth, M. Regine, D. Abruzzese, D. Carnevale, A. Bigi, S. Teggi, S. Berardi, M. P. Bogliolo, and I. Verginelli.
Environmental Science & Technology 59(16):8221-8230(2025)

This study introduces an innovative, low-cost static flux chamber for real-time monitoring of VOC emissions at contaminated sites. Compared to traditional static flux chambers, the developed system is fully automated, eliminating the need for continuous operator intervention in the field. The cylindrical stainless-steel chamber (6.28 L) is equipped with internal sensors for temperature, pressure, and humidity, and a low-cost PID sensor for VOC detection (0.001-40 ppm). VOC flux is determined over 10 min measurement cycles, with two micro diaphragm pumps purging the chamber to reset concentrations. An Arduino Uno microcontroller manages the system, enabling local data storage (SD card) and a LoRa module to send real-time data to the cloud using IoT systems. Accuracy and repeatability were assessed through lab-scale emission tests under dynamic conditions using various aliphatic and aromatic VOCs. Results closely matched those from a commercial gas analyzer and a Comsol Multiphysics numerical model, confirming the system's reliability. These findings support its potential as a cost-effective alternative for continuous VOC monitoring.

REALISTIC AND FIELD SCALE APPLICATIONS OF BIOCHAR FOR WATER REMEDIATION: A LITERATURE REVIEW
Fang, J., D. Wang, R. Wilkin, and C. Su.
Journal of Environmental Management 385:125524(2025)

Thirty-one studies were evaluated on realistic applications of biochar for water remediation by searching the keywords pilot scale, field scale, and mesocosm scale combined with biochar and water remediation. Biochar was incorporated into a variety of water remediation technologies for treating both inorganic and organic contaminants, such as nutrients, heavy metals, pesticides, and pharmaceuticals in polluted waters and wastewaters. Biochar showed the potential to be effective on a field scale or in realistic remediation technologies, although it is not always as effective as other sorbents such as activated carbon (AC), partially because AC has better physicochemical characteristics, such as higher surface area and more micropores. Effectiveness for contaminant removal varied according to the targeted contaminants, the type and dosage of biochar used, and the treatment technology incorporating biochar. Knowledge gaps and future research areas are identified, such as more field-scale studies needed to test the effectiveness of biochar as an adsorbent under realistic conditions to pinpoint specific characteristics suitable for target contaminants. Physicochemical characteristics of the biochar can also change over time during the treatment process due to weathering, which may negatively affect the treatment performance. The effects of scaling up production on biochar quality should also be further investigated, as physicochemical characteristics can be affected by varying the synthesis conditions. Regeneration and disposal of spent biochar is another active research area to determine the overall treatment costs.

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

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