Technology Innovation News Survey

Entries for September 16-30, 2023

Market/Commercialization Information

F -- REMEDIATION SERVICES AT THE ELY COPPER MINE SUPERFUND SITE IN VERSHIRE, VERMONT (SOL)
U.S. Army Corps of Engineers, North Atlantic Division, New England District, Concord, MA
Contract Opportunities on SAM.gov, W912WJ23R0005, 2023

This is a total small business set-aside under NAICS code 562910. The U.S. Army Corps of Engineers, New England District, seeks a contractor to perform remediation services at the 350-acre Ely Copper Mind Superfund Site in Vershire, Vermont. The Site includes features such as waste rock and mine process waste piles, intact and collapsed adits and shafts, remnant foundations of former mine operation buildings, a 1,500-foot-long smoke flue, and over 3,000 linear feet of underground workings. Waste areas include former ore roast beds, waste rock piles, a tailings pile, a former smelter area, and a slag pile, all located within the watershed of Ely Brook. Work will include the development of various project plans, general site mobilization and preparation, site mobilization and preparation for Operable Units 1 and 2, and general site winterization and demobilization. The award will be a Single Award Task Order Contract (SATOC), Indefinite Delivery/Indefinite Quantity (ID/IQ) contract not to exceed $40,000,000 and with a five-year ordering period. Offers are due by 2:00 PM EST on November 22, 2023. https://sam.gov/opp/eec5736569ee4b3ab47b6a1c1f709a6f/view

Z -- AK-YUKON DELTA NWR-BIA-SOIL REMEDIATION (SOL)
U.S. Department of the Interior Fish and Wildlife Service, Construction A/E Team 3, Falls Church, VA
Contract Opportunities on SAM.gov, Solicitation 140FC323R0023, 2023

This is a full and open competition under NAICS code 562910. The U.S. Department of the Interior Fish and Wildlife Service requires a contractor to remediate fuel-contaminated soils from a site within the Yukon Delta National Wildlife Refuge in Bethel, Alaska. Work will include development of a workplan, mobilization and demobilization services, sampling of the site, treatment of the 4,000 cubic yards of soil, and development of a closure report. The magnitude of construction is between $1 million and $5 million. The award will be a firm-fixed-price construction with a period of performance from December 1, 2023, through September 30, 2024. Offers are due by 4:00 PM AKST on November 8. https://sam.gov/opp/3f7277a1418a4ec496badb33d101ad90/view

ENVIRONMENTAL REMEDIATION SERVICES SATOC (SRCSGT)
U.S. Army Corps of Engineers, South Atlantic Division, Savannah, GA
Contract Opportunities on SAM.gov, Solicitation W912HN-24-S-1000, 2023

This is a sources sought notice for market research purposes only. The U.S. Department of Veterans Affairs seeks to identify potential parties with an interest in and capability of performing environmental remediation services under NAICS code 562910. This survey seeks information from industry to develop an acquisition strategy. The purpose of this anticipated contract is to provide a full range of environmental remediation services (ERS). The environmental remediation service consists of environmental remediation for hazardous toxic and radioactive waste (HTRW) sites to include incidental military munitions response and range and UXO support. This will NOT include services that are solely military munitions response and range and UXO support. Services may include, but are not limited to, the assessment, inspection, investigation, study, control, characterization, containment, removal and/or treatment of environmental contamination from pollutants, toxic substances, perfluorinated compounds, radioactive materials, and hazardous materials. The military munitions response and range and UXO support will assist with preliminary assessments, site inspections, remedial investigations, feasibility studies, and site removal actions. ERS projects include both civilian and military agencies of the Federal Government. The estimated value of this future contract is $10 million with a three-year period of performance. Work is expected to be performed for the customers of the U.S. Army Corps of Engineers, South Atlantic Division, and the Southeastern Regional Environmental Office on the Installation Management Command, Atlantic Region (IMCOM), and existing customers. The contractor may be required to perform tasks on-site or at their own facilities. There is no solicitation at this time. Responses are due by 3:00 PM EST on November 9, 2023. https://sam.gov/opp/d6155fcb4c6e4f67852802dbee5c6068/view

F -- GATE 308504: HANGARS 3 AND 4, HAZARDOUS MATERIAL REMEDIATION AND SELECTIVE DEMOLITION (SRCSGT)
U.S. Department of the Interior, National Park Service, DSC Contracting Services Division, Denver, CO
Contract Opportunities on SAM.gov, Solicitation 140P2024R0023, 2023

This is a sources sought notice for marketing research purposes only under NAICS code 562211. The National Park Service seeks to gain knowledge regarding the type of interested businesses and their qualifications to provide remediation and/or removal of hazardous materials within the hangars and connecting buildings at the Floyd Bennett Field within the Gateway National Recreation Area in New York. Lead-based paint, asbestos-containing materials, mold, and PCB-containing light figures are some of the anticipated items on the project. The project also includes selective demolition of multiple areas within the structures. Removal and disposal of garbage, debris, and other items is anticipated. The National Park Service will use the information obtained through this notice to develop an acquisition strategy. Capability statements are due by 2:00 PM EST on November 10, 2023.
https://sam.gov/opp/5c2d673cbc8441f19b6eef33eb67aa4d/view

Cleanup News

FULL-SCALE PILOT DEPLOYMENT AND ACCELERATED TREATMENT DESIGN PROVIDES RAPID RESPONSE TO PFAS THREATS
Francis, S. and B. Martin.
Journal of the New England Water Works Association 137(1):19-30(2023)

All public water supply samples collected in Devens, Massachusetts, for PFOA and PFOS, were less than EPA's Health Advisory of 70 ppt until December 2017. Given that the Massachusetts Department of Environmental was considering three additional PFAS compounds under the Office of Research Standards Guidelines of 70 ppt and potentially as low as 20 ppt, the MacPherson Well was shut off out of an abundance of caution, as PFOS and PFOA sampling results had been as high as 69 ppt. Over the following five years, action was taken to implement temporary and permanent treatment systems to meet the PFAS regulations. Temporary treatment systems were accepted as full-scale pilot systems, leading to the optimum design of permanent PFAS treatment systems.

DIFFERENTIATING CVOCS IN BEDROCK AND ALTERNATE REMEDIATION CRITERIA: RATIONALE AND REGULATORY CONCURRENCE
Hutnick, D.C. and N.A. Stevens. | AEHS Foundation 32nd Annual International Conference on Soil, Water, Energy and Air, Workshop 6, 20-23 March, San Diego, CA, 20 slides, 2023

CVOCs migrated by advection in groundwater from an industrial drycleaning facility located northeast and along a bedrock strike of a petroleum facility to the southwest. Transport of CVOCs to the petroleum facility occurred via fracture flow enhanced by pumping a water supply well. Bedrock structure consists of fractures and joints with bedding planes that strike northeast and dip northwest with a shallow dip angle (5 to 12 degrees). Combined with a weathered bedrock zone to ~60 ft bgs, the bedding planes are significant conduits for groundwater flow and contaminant transport. A forensic assessment and conceptual site model demonstrated that most CVOCs in bedrock, particularly along the defined transport pathway, were attributable to offsite sources. TCE exhibited the greatest concentration difference between offsite (2,710 µg/L) and onsite (147 µg/L) bedrock groundwater relative to a regulatory standard of 1 µg/L. Consequently, the remediation goal was to reduce TCE concentrations by 146 µg/L. An alternative approach was used to develop site-specific alternative remediation goals for up to 27 individual CVOCs. Through engagement, technical demonstration, and documentation, the state regulatory agency accepted the approach. Alternative regulatory criteria were implemented for the petroleum facility, allowing the responsible party to proactively address its environmental obligations in a focused manner.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File23333/Handout_152_1015124833.pdf

HEAT ENHANCED REDUCTIVE BIOREMEDIATION
Birk, G. | AEHS Foundation 39th Annual International Conference on Soil, Sediments, Water and Energy, Workshop 6, 20-23 March, San Diego, CA, 38 slides, 2023

Enhanced reductive bioremediation using In Situ Alcoholysis overcomes poor fatty acid subsurface distribution and biofoulingvegetable oil (EVO) injection. The method is generally directed towards vegetable oil transesterification to improve the formation and distribution of slowly fermenting and soluble electron donors favorable to anaerobic reductive bioremediation. Recent fieldwork in the U.S. and Australia demonstrated that In Situ Alcoholysis reactions can treat >90% of the contaminant mass within 90 days. The typical aquifer temperature is ~15°C; adding heat enhances the process as the reaction temperature significantly influences the transesterification reaction and enhances degradation rates, decreasing the time needed for the transesterification reactions from months to hours. Heat sources include steam, electrical resistance heating, thermal conduction heating, gas thermal heating, or residual heat from an in situ thermal remediation project. Methods of heating the amendment mixture and injecting hot water, which offers several advantages, are presented. In general, hot water dissolves fewer gases (like oxygen or carbon dioxide) but more solids (sugars) than cold water. Temperature modeling results show that the injection of water heated to 90°C into 3 injection wells at a flow rate of 150 m³/d was able to maintain temperatures of >30°C for 10 days in the vicinity of the injection wells.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File23333/Handout_169_1015090715.pdf

HORIZONTAL DIRECTIONAL DRILLING AND HORIZONTAL WELLS TO ENHANCE REMEDIATION AT COMPLEX SITES
Carlton, K.J. NAVFAC Remediation Innovative Technology Seminar, 100 slides, 2023

The Navy installed horizontal wells at several ER and BRAC sites to remediate petroleum hydrocarbons, chlorinated solvents, metals, and other COCs in conjunction with various treatment technologies, such as ISCO, SVE, and MPE, to mitigate vapor intrusion beneath buildings. The presentation provides an overview of best practices for installing and operating horizontal wells, highlights recent advances in design and emplacement methods, and provides case studies employing horizontal wells highlighting success stories and lessons learned.

https://exwc.navfac.navy.mil/Portals/88/Documents/EXWC/Restoration/er_pdfs/rits/RITS%20HDD_final_PAO.pdf?ver=xuVMobTU90p3fvbHTIdFtg%3d%3d

Demonstrations / Feasibility Studies

COMBINED ACTIVE AND PASSIVE IN SITU REMEDIATION APPROACH FOR HIGH CONCENTRATION METALS IN GROUNDWATER

King, T. | AEHS Foundation 39nd Annual International Conference on Soil, Sediments, Water and Energy, Workshop 6, 20-23 March, San Diego, CA, 26 slides, 2023

A large-scale urban fill site in the northeast U.S. impacted with cadmium, copper, and zinc required remediation to reduce the flux of metals in groundwater discharging to an adjacent river. Bench-testing of a multi-phased remediation technology was performed on vadose and saturated source zone soils and groundwater to test geochemical stabilization of the metals in soils and groundwater using variable doses of iron sulfide and calcium polysulfide reagents. Stabilization/solidification was tested by mixing Portland Cement with site soil. Treatment efficacy was evaluated by measuring post-treatment leachable metals, pH, and geotechnical properties. A decision matrix was used to holistically assess the results of the predesign investigation and bench testing to select a remedy. Key considerations included reduction of mass flux in groundwater, geochemical effects, long-term performance, cost-effectiveness, resiliency, and sustainability. The selected remedial approach incorporated a combination of source area in situ remediation, in situ stabilization/solidification of soil, and downgradient permeable reactive barriers applied in a phased and flexible manner. Bench-testing indicated that two to nearly three orders of magnitude concentration reduction of metals in groundwater and leachable metals could be achieved. The solidified/stabilized soil resulted in hydraulic permeabilities several orders of magnitude lower than adjacent site soil and sufficient geotechnical strength. The bench-testing results were then scaled to field pilot tests for soil and groundwater. The optimized full-scale approach that was developed based on the pilot testing results is reviewed in the presentation.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File23333/Handout_226_1018044149.pdf

IN SITU REMEDIATION OF TNT RED WATER CONTAMINATED SOIL: FIELD DEMONSTRATION

Xu, W., Q. Zhao, and Z. Ye.
Soil and Sediment Contamination: An International Journal 32(8):941-953(2023)

A two-year pilot study was conducted on ~1.5 x 105 m^3 soil contaminated by TNT red water (containing mainly dinitrotoluene sulfonates [DNTS]) at several sites in China. The contamination was treated using integrated desorption-biostimulation and bioaugmentation-phytoremediation treatment technologies. Soil samples were taken every six months to determine the concentration of nitro-aromatic compounds. Acute toxicity and Fluorescein diacetate (FDA) hydrolytic activity tests evaluated the remediation effect. The total nitroaromatic compounds were effectively removed after 2 years, with an average removal efficiency of 99.88% and 90.47% at sites planted with alfalfa and reed, respectively, significantly reducing the toxicity. The average luminescence inhibition ratio was reduced from 92.64% to 3.37% and 29.16%, respectively. The soil microbial activity was significantly improved, with the highest FDA hydrolase activity in the surface layer. The integrated technologies used have the potential for decontaminating munition-contaminated sites.

HYDROCARBON BIOREMEDIATION IN A PILOT-SCALE: A COMBINATION OF BIOAUGMENTATION, PHYTOREMEDIATION, AND VERMIREMEDIATION

Martinez-Rabelo, F., L.A. Gomez-Guzman, D.R. Garcia-Segura, E. Villegas-Garcia, J. Rodriguez-Campos, J.B. Velazquez-Fernandez, B. Hernandez-Castellanos, I. Barois, and S.M. Contreras-Ramos. | Environmental Technology & Innovation 31:103210(2023)

A pilot study aimed to validate total petroleum hydrocarbons (TPH) removal. Six stockpiles of oil-contaminated soil were treated with bioremediation (BIO) by three simultaneous technologies (bioaugmentation (bacterial consortium), phytoremediation (*Panicum maximum*) and vermiremediation (*Pontoscolex corethrurus*) and compared with natural attenuation (NA). Removal of alkanes, PAHs, TPH, and bacterial diversity was evaluated at 0, 35, 70, and 112 days. Biomass and number of shoots of *P. maximum*, the secondary vegetation, and the abundance of meso and macrofauna were measured initially and at the end. After 112 days, BIO significantly removed more alkanes (76%), PAHs (68%), and TPH (76%) than NA treatment (23%, 19%, 24%). P. maximum biomass increased significantly (300%), with 97.3 ± 11.8 shoots/m^2. After 112 days, the secondary plants *Lippia dulcis*, *Taraxacum officinale*, *Bidens pilosa* and *bacterial phylum* Actinobacteria (18%) were the most abundant. The abundance of the earthworm *Protozapotecia australis* was reduced, while the most abundant group of mesofauna was Acari (56%-71%). This combination of technologies improved the development of grass and secondary plants, which generated a more favorable microhabitat for soil organisms to remove TPH more efficiently.

ENHANCED REMOVAL OF CIS-1,2-DICHLOROETHENE AND VINYL CHLORIDE IN GROUNDWATER USING BALL-MILLED SULFUR- AND BIOCHAR-MODIFIED ZERO-VALENT IRON: FROM THE LABORATORY TO THE FIELD

Qian, L., H. Li, Z. Wei, C. Liang, X. Dong, D. Lin, and M. Chen.
Environmental Pollution 336:122424(2023)

A series of lab and field studies determined whether sulfur- and biochar-modified ZVI (ZVI-BC-S) enhances the removal of cDCE and VC in groundwater. Biochar and sulfur facilitated the milling of ZVI-BC-S into micro- and nanoscale particles and increased FeS formation. Moreover, cDCE and VC removal rates by ZVI-S increased by 30.1% and 30.2%, respectively, compared to those obtained with ZVI, due to enhanced dechlorination via β-elimination by sulfur. Treatment with ZVI-BC-S harnessed the benefits of biochar and sulfur to enhance the cDCE and VC removal rates by 62.0% and 67.7%, respectively. Mechanistically, biochar enhanced ZVI-S corrosion to increase FeS production and enhance the electron transfer, β-elimination, and hydrogenolysis involved in cDCE and VC dechlorination. The effectiveness of ZVI-BC-S was confirmed in a field demonstration where cDCE and VC concentrations significantly decreased within 10 days following injection. The findings can help inform the rational design of ZVI for in-situ remediation of chlorinated hydrocarbons in groundwater. *See the introduction and section snippets at* https://www.sciencedirect.com/science/article/abs/pii/S0269749123014264.

Research

MEMBRANE FUNCTIONALIZATION APPROACHES TOWARD PER- AND POLYFLUOROALKYL SUBSTANCES AND SELECTED METAL ION SEPARATIONS

Leniz-Pizarro, F., H.E. Rudel, N.J. Briot, J.B. Zimmerman, and D. Bhattacharyya.
ACS Appl Mater Interfaces 15(37):44224-44237

Three types of adsorptive/ion exchange (IX) polymers containing strong/weak acid, strong base, and iron-chitosan complex groups were synthesized in the pores and partially on the surface of microfiltration (MF) membranes and tested to remove organic and inorganic cations and anions from water, including arsenic, PFAS, and calcium (hardness). Adsorptive/IX pore-functionalized membranes demonstrated an increased relative sorption capacity, up to 2 orders of magnitude faster kinetics, and the ability to regenerate up to 70-100% of their capacity while concentrating the initial solution concentration up to 12 times when directly compared with beads (0.5-6 mm) and crushed resins (0.05 mm). The synthesis approach used to functionalize membranes, which is independent of the polymer type of the MF membrane, utilized pores throughout the entire cross-section of the membrane to immobilize the polymers that contain the functional groups. Utilizing the pore volume of commercial membranes (6-112 mL/m^2), the scientific weight capacity of the polymer (3.1-11.5 mequiv/g), and the synthesis conditions (e.g., monomer concentration), the theoretical adsorption/IX capacities per area of the membranes were calculated to be as high as 550 mequiv/m^2, substantially higher than the 175 mequiv/m^2 value needed to compete with commercially available IX resins. The work shows that pore-functionalized membranes are a promising path to tackle water contamination challenges, lowering separation diffusion limitations.

POTENTIAL IMPACT OF BACTERIA ON THE TRANSPORT OF PFAS IN POROUS MEDIA

Dai, M., N. Yan, and M.L. Brusseau.
Water Research 243:120350(2023)

This study focused on the impact of bacteria on the retention and transport of PFAS. The first part of the study involved a critical review of prior studies to delineate observed PFAS-bacteria interactions and to summarize the mechanisms of PFAS sorption and retention by bacteria. Retention of PFAS by bacteria can occur through sorption onto cell surfaces and/or by incorporation into the cell interior. Factors such as the molecular structure of PFAS, solution chemistry, and bacterial species can affect the magnitude of PFAS sorption. The second part of the study investigated the influence of bacteria on PFAS retention and transport with a series of batch and miscible-displacement experiments. Batch experiments were conducted using Gram-negative *Pseudomonas aeruginosa* and Gram-positive *Bacillus subtilis* to quantify PFOS sorption. Results indicated that both bacteria showed strong adsorption of PFOS, with no significant difference in adsorption capacity. Miscible displacement experiments were conducted to examine PFOS retention and transport in untreated sand and sand inoculated with *Pseudomonas aeruginosa* or *Bacillus subtilis* for 1 and 3 days. PFOS transport exhibited greater retardation for the experiments with inoculated sand. The enhanced sorption was greater for the 3-day inoculation than the 1-day, indicating that biomass is an important factor affecting PFOS transport. A mathematical model representing transport with nonlinear and rate-limited sorption successfully simulated the observed PFOS transport.

PYROLYSIS TEMPERATURE AND BIOCHAR REDOX ACTIVITY ON ARSENIC AVAILABILITY AND SPECIATION IN A SEDIMENT

Soares, M.B., O.W. Duckworth, M. Styblo, P.H. Cable, and L.R.F. Alleoni.
Journal of Hazardous Materials 460:132308(2023)

A study investigated the effect of pyrolysis temperature and biochar application on the release and transformations of As in contaminated sediments subjected to redox fluctuations. Biochar application and pyrolysis temperature were important in As species availability, As methylation, and dissolved organic carbon concentration. Successive flooding cycles that induced reductive conditions in sediments increased the As content in the solution by up to seven times. Applying biochar and the flooding cycle altered the spatial distribution and speciation of carbon, iron (Fe), and As in the solid phase. Biochar application generally decreased Fe(III) and As(V) reduction after the first cycle of flooding. Results demonstrate that the flooding cycle plays an important role in the reoxidation of biochar to the point of enhancing the immobilization of As.

INDUSTRIAL SCWO FOR THE TREATMENT OF PFAS/AFFF WITHIN A WATER MATRIX

Sahle-Demessie, Endalkac, C. Berg, E. Shields, S. Jackson, I. George, K. Liberty, and J. Follin. EPA Office of Research and Development, EPA/600/R-22/257, 2022.

This document provides an overview of the General Atomics (GA) supercritical water oxidation SCWO technology tests, a summary of the results, and discusses various opportunities for use. GA and EPA's Office of Research and Development (ORD) agreed to allow for testing of the removal efficacy and destruction of PFAS within aqueous film-forming foam (AFFF) using supercritical water oxidation (SCWO) technology to conduct treatability studies of low-to-medium dilutions of AFFF and identify the destruction efficiency of PFAS. Liquid influent feed stream and both liquid and gas effluent stream samples were collected and tested using various methods including, but not limited to EPA Method 537.1 for quantitative analysis of targeted PFAS in liquids, total organic carbon, chemical oxygen demand, total organic fluoride, non-targeted PFAS analysis, elemental analysis, and real-time measurement of stack emission flow to confirm the absence of various gases. Sorbent tubes and canisters were used to sample gas for VOCs, PFAS, and other reaction by-products. PFAS and total organic carbon destruction efficiencies in all tests were >99.99%. Gas analyses did not detect PFAS target compounds above the background level. The sorbent tubes detected many trace organic compounds but no fluorinated compounds. Hydrogen fluoride was not detected in effluent streams after appropriate caustic neutralization of the reaction products. After 50 hours of operation, limited corrosion was observed as there was a slight increase in chromium concentrations in the effluent stream. Fluorine appears mainly as a fluoride ion in the liquid effluent. Trace amounts of fluorinated hydrocarbon were also found in the liquid effluent. However, it is unclear if this is from the contaminated quench water (softened tap water) that was shown to have higher PFAS levels than the liquid effluent. Some qualitative interpretation regarding Non-Targeted Analysis (NTA) is provided, though not all NTA work is comparable. Limited data is available on the SCWO degradation pathways for the different PFAS. https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=546712&Lab=CESER

UTILITY OF DIFFUSIVE GRADIENT IN THIN-FILM PASSIVE SAMPLERS FOR PREDICTING MERCURY METHYLATION POTENTIAL AND BIOACCUMULATION IN FRESHWATER WETLANDS

Neal-Walthall, N., U. Ndu, N.A. Rivera Jr, D.A. Elias, and H. Hsu-Kim.
Environmental Science & Technology 56(3):1743-1752(2022)

A study explored the use of diffusive gradient in thin-film (DGT) passive samplers to simultaneously quantify the methylation potential of inorganic Hg (IHg) and the bioaccumulation potential of methylmercury (MeHg) in freshwater wetlands. Outdoor freshwater wetland mesocosms were amended with $^{202}Hg^{2+}$, ^{201}Hg-humic acid, ^{199}Hg-sorbed to FeS, and ^{200}HgS nanoparticles. Six weeks after the spikes, DGT samplers were deployed in the mesocosm water and sediments to evaluate DGT-uptake rates of total Hg, MeHg, and IHg (calculated by difference) for the Hg isotope spikes and to examine correlations with total Hg, MeHg, and IHg concentrations in sediment, water, and micro and macrofauna in the ecosystem. In the sediments, greater relative MeHg concentrations were observed from the initially dissolved IHg isotope spikes and lower MeHg levels from the initially particulate IHg spikes. These trends were consistent with the uptake flux of IHg into DGTs deployed in surface sediments. Correlations were observed between total Hg-DGT uptake flux and MeHg levels in periphyton biofilms, submergent plant stems, snails, and mosquitofish in the ecosystem. These correlations were better for DGTs deployed in the water column than DGTs in the sediments, suggesting the importance of the vertical distribution of bioavailable MeHg in relation to food sources for macrofauna. Overall, results demonstrate that DGT passive samplers are a relatively simple and efficient tool for predicting IHg methylation and MeHg bioaccumulation potentials without explicitly delineating IHg and MeHg speciation and partitioning in complex ecosystems.

General News

A CRITICAL REVIEW OF PERFLUOROALKYL AND POLYFLUOROALKYL SUBSTANCES (PFAS) LANDFILL DISPOSAL IN THE UNITED STATES

Tolaymat, T., N. Robey, M. Krause, J. Larson, K. Weitz, S. Parvathikar, L. Phelps, W. Linak, S. Burden, T. Speth, and J. Krug. I Science of The Total Environment 905:167185(2023)

This document summarizes state and federal initiatives and critically reviews peer-reviewed literature to define best practices for managing landfill materials containing PFAS from municipal solid waste and other waste streams to identify data gaps and guide future research. The objective is to inform stakeholders about waste-derived PFAS disposed of in landfills, PFAS emissions, and the potential for related environmental impacts. The article also highlights data gaps and uncertainties concerning the fate of PFAS during landfill disposal. Few studies have attempted to estimate PFAS loading in landfills or other effluent streams such as landfill gas (LFG). In all media, the reported total PFAS heavily depends on waste types and the number of PFAS included in the analytical method. Early studies that only measured a small number of PFAS, predominantly PFAAs, likely reported a significant underestimation of total PFAS. Major findings include relationships between PFAS effluent and landfill conditions; biodegradable waste increases PFAS transformation and leaching. Based on the results of multiple studies, it is estimated that 84% of PFAS loading to MSW landfills (7.2 T total) remains in the waste mass, while 5% leaves via LFG and 11% via leachate annually.

SUPERFUND ENVIRONMENTAL JUSTICE BEST PRACTICES

EPA Environmental Justice Best Practices Workgroup, 35 pp, 2023

A key EPA objective is to ensure everyone experiences the same degree of protection from environmental health hazards. About 73 million people live within 3 miles of a Superfund site. Many of the communities within this range have a higher number of low-income people, people of color or indigenous people. They are also more burdened by other environmental stressors (e.g., poor air quality, lead paint) when compared to the general population. EPA is prioritizing environmental justice throughout the cleanup process, including when engaging communities, making cleanup decisions and supporting Superfund site reuse. A cornerstone of environmental justice is to advocate for and strengthen early and meaningful community participation during Superfund cleanups to ensure communities have a voice throughout the decision-making process. The community engagement approach selected for each site draws on a robust set of tools and resources developed over the past several decades to address environmental justice through outreach, translation, needs assessments, technical assistance and capacity building. This Environmental Justice Best Practices Guidance document outlines tools, strategies and approaches for site teams to consider while addressing environmental justice concerns throughout the cleanup and redevelopment process. Drawn from across the EPA Regions, these best practices, tools and lessons learned from one site team can inspire and fuel ideas and action in another. The report also describes 13 successful practices that site teams have employed to reduce risks and improve environmental quality while providing significant benefits for underserved and overburdened communities.

MEDICAL ANALOGUE FRAMEWORK FOR NATURAL REMEDIES AND PASSIVE RISK-MITIGATION MEASURES IN ENVIRONMENTAL REMEDIATION

Divine, C., M. Heintz, S. Dunn, and A. Pennington
Groundwater Monitoring & Remediation 43(2):13-25(2023)

Natural processes that destroy, transform, and/or attenuate contaminants operate to varying degrees at every environmental restoration site from initial release until "closure" or attainment of restoration goals. These processes complement active remediation efforts, are the primary restoration processes in impacted areas that are not actively treated, and are relied upon where active treatment is considered complete, but at sites where ultimate target concentrations have not been attained. The site restoration lifecycle exhibits notable parallels to the healing process when there has been injury or illness to the human body. As such, it may be useful to consider a new perspective and framework on the role of natural remediation, adopting relevant concepts from medicine. Specifically, the authors suggest that:

- The release of potentially undesirable materials into the environment is similar to an injury to the human body.
- Natural remedies can be equipped to the body's healing processes.
- In this context, active remediation efforts are analogous to medical interventions.

The authors also suggest that the medical and environmental professions share the following several axioms or general principles:

- Observe natural processes to leverage their potential and read their warning signs.
- Use a targeted and appropriate degree of intervention where necessary.
- Mitigate risks with controls and monitoring.
- No intervention should waste resources or risk greater impact than the ailment.
- Foster trusting relationships with honesty and a willingness to adapt.

LINES OF EVIDENCE FOR EVALUATING LNAPL AND DISSOLVED-PHASE PLUME-STABILITY AT PETROLEUM SITES

Johnson, W. I AEHS Foundation 39th Annual International Conference on Soil, Sediments, Water and Energy, Workshop 6, 20-23 March, San Diego, CA, 19 slides, 2023

This presentation highlights the application of high-resolution site characterization (HSRC) tools and methods to evaluate LNAPL and dissolved-phase plume stability within the expanding science of plume stability and exposure characterization. It outlines evolving, multi-discipline techniques to characterize LNAPL bodies and dissolved-phase groundwater plumes, with an emphasis on the application of HRSC tools. Source material includes references to previously published and presented concepts and data sets, with a primary focus on the role of HRSC within the expanding field of petroleum plume stability, exposure, and site closure. Case studies and references to existing LNAPL guidance documents are incorporated to develop the role of HRSC in LNAPL science, site characterization, and low-risk site closure.
https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-FA2F-2B6D-01D92AC0F42DCE3B_abstract_File23333/Handout_140_1019043159.pdf

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

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