Technology Innovation News Survey

Entries for March 16-31, 2024

Market/Commercialization Information

F -- JOINT BASE CAPE COD (JBCC) OPTIMIZED REMEDIATION CONTRACT (ORC) (SOL)

U.S. Army Corps of Engineers, North Atlantic Division, Baltimore, MD
Contract Opportunities on SAM.gov W912DR24R0018, 2024

This is a total small business set-aside under NAICS code 562910. The U.S. Army Corps of Engineers requires a contractor to perform environmental remediation activities at Joint Base Cape Cod (JBCC). The range of activities includes investigation, design, construction of remedial systems, operation, and maintenance of established remedies, including wind turbines, optimization at applicable sites, and achievement of site-specific objectives. The Contractor shall undertake Environmental Remediation activities to achieve Performance Objectives at sixteen (16) Installation Restoration Program (IRP) sites and one (1) Military Munitions Response Program (MMRP) site. The award will be a firm-fixed-price standalone C-type environmental services contract. Offers are due by 12:00 PM EDT on May 22, 2024. https://sam.gov/opp/2a5c67e8c5694511942f70abcecc8b8d/view

COMPOSITE CAP INSTALLATION OVER CONTAMINATED MINE WASTE ASSOCIATED WITH THE CALLAHAN MINE SUPERFUND SITE IN BROOKSVILLE, MAINE (SRCSGT)

U.S. Army Corps of Engineers, New England District, Concord, MA
Contract Opportunities on SAM.gov W912WJ24X0038, 2024

This is a sources sought notice for marketing research purposes. The U.S. Army Corps of Engineers, New England District seeks to determine the interest, availability, and capability of 8(a), HUBZone, Service-Disabled Veteran-Owned, Women-Owned, and Small Business concerns under NAICS code 562910 to install a composite cap over ~13 acres of contaminated mine waste associated with the Callahan Mine Superfund Site in Brooksville, Maine. The purpose of the cap is to limit infiltration through mine waste remaining after historical copper mine operations performed on the property. The mine waste consists of rock and rock-amended sediment previously consolidated and graded as part of recent and ongoing Superfund remediation activities. The expected components of the composite cap include in order from the surface: 12 inches of crushed stone (3-inch minus), geocomposite drainage layer, 60-mil textured geomembrane (seam welded), and geofabric. All crushed stone will be sourced from onsite and imported granular material will not be required. Other activities to be performed under this contract may include the installation of drainage features (e.g., swales, culverts, etc.), grading, seeding, and stabilization of disturbed areas outside the stone cover system, rock crushing, stockpile management, and wetland improvements. Capabilities packages are due by 2:00 PM EDT on May 22, 2024.
https://sam.gov/opp/aa796b88c8a54189926c39f8e25e3324/view

F -- SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM (START) CONTRACT (COMBINE)

U.S. Environmental Protection Agency, Region 3 Contracting Office, Philadelphia, PA
Contract Opportunities on SAM.gov 68HE0324R0016, 2024

This is a full and open competition under NAICS code 541620. EPA seeks qualified firms interested in providing nationally consistent advisory and assistance services to EPA's On-Scene Coordinators (OSCs) and other federal officials implementing EPA's responsibilities under the national response system under its Superfund Technical Assessment and Response Team (START) contract. The technical requirements include response, preparedness and prevention, assessment and inspection, technical support, data management, and training. Work includes Response Activities in the areas of Emergency Response, Counter-Terrorism Response, Oil Spill Response, Fund-Lead Removal, Potentially Responsible Party Responses, and Minor Containment Response; Assessment/Inspection Activities to identify the priority sites posing threats to human health or the environment; Technical Support Activities to include public participation, administrative records, enforcement support, cost recovery, and general technical support; Data Management Support; Preparedness and Prevention Activities including contingency planning, counter-terrorism/domestic preparedness and prevention, chemical emergency preparedness and prevention, and continuous release; Non-Routine Technical Support Activities; and Training. The period of performance of this contract shall be from December 1, 2024, through November 30, 2029, exclusive of all required reports. Offers are due BY 2:30 PM EDT on June 6, 2024. https://sam.gov/opp/3544cefc3b154a7f8bdcef2d89875968/view

Cleanup News

LONG-TERM EVALUATION OF HYDROCARBON DEGRADATION RATES WITHIN THE SOURCE ZONE UNDER NATURAL AND ENHANCED ATTENUATION FOR SITE CLOSURE PURPOSES

Schneider, M.R., A.C.C. Bortolassi, A.U. Soriano, M.P.M. Baessa, M.L.B. da Silva, and A.J. Giachini. | Remediation 34(3):e21778(2024)

Four independent controlled-release sites containing a particular fraction of ethanol in gasoline (10%, 24%, 25%, and 85% [v/v]) were subjected to monitored natural attenuation (MNA) alone (E24 and E85) and nitrate (E25) and sulfate (E10) biostimulation near the source zone, and monitored for site closure for ~ 18 years. Both natural source zone depletion and biostimulation reduced benzene concentrations to acceptable remediation target levels. Benzene biodegradation rates (λs) were one order of magnitude higher than those reported in the literature for diluted concentrations in groundwater plumes. The decay rate of benzene varied between 0.45 and 1.75/year and was strongly influenced by the mass of ethanol. Compared to biostimulation with nitrate (half-life of 1.52 years), MNA alone resulted in faster benzene removal rates (half-life of 0.96 years). Anaerobic biostimulation with sulfate had negligible effects on BTEX biodegradation compared to natural attenuation alone. The highest ethanol concentration (E85) led to faster benzene removal (with a half-life of 0.40 years), which was even higher than MNA under lower ethanol concentrations (E24). Benzene half-life was 2.2-fold slower at the site with the lowest ethanol (E10) compared to E85, indicating that the negative effects of ethanol on BTEX biodegradation appeared to be short-lived and may need to be reevaluated over the long term. Benzene decay rates were ~6 times slower in the source zone than those obtained for groundwater plumes, emphasizing the importance of targeting the LNAPL after plume retreat. Findings can assist practitioners in better predicting the lines of evidence for BTEX bioremediation and remediation cleanup times at a lower cost in the presence of ethanol and serve as a guide to help determine whether biostimulation is necessary to expedite source zone remediation for site closure.

ANALYSIS OF SUSTAINABLE REMEDIATION TECHNIQUES AND TECHNOLOGIES BASED ON 10 EUROPEAN CASE STUDIES

Sweeney, R., N. Harries, P. Bardos, and E. Vaiopoulou.
Remediation 34(2):e21773(2024)

This paper considers how sustainable remediation is being deployed in practice based on a review of 10 sustainable remediation case studies, primarily from the United Kingdom but also from Spain and Belgium, collated for the European industry network Concawe. The case studies demonstrate a range of sustainable remediation techniques and technologies. They also show the importance of conceptual site models in remediation strategy discussion and development and the importance of a team-based approach toward achieving robust progress and endpoints. Each case study includes an individual case study report, which can be downloaded for free from www.claire.co.uk/concawe. *This article is* ***Open Access*** *at* https://onlinelibrary.wiley.com/doi/10.1002/rem.21773.

SUSTAINABLE RESILIENT REMEDIATION OF THE HAJEK HCH SITE USING THE WETLAND+ SYSTEM

Cernik, M. | Pacific Northwest National Laboratory RemPlex seminar, 20 minutes, 2023

The Wetland+® system, a sustainable passive treatment system based on oxidation-reduction and biosorption methods, was used to treat contaminated waste products from lindane production at the Hajek site. The system has several steps: a permeable reactive barrier filled with Fe chips, where hexachlorocyclohexanes (HCHs) are partially dechlorinated, and chlorobenzenes (CIB) are formed; a biosorption unit, where HCH compounds are adsorbed and subsequently degraded by present microorganisms; and an aerobic wetland, where the plant root system purifies the water, and the concentration of HCHs and their daughter products decrease below specified limits. After two years, the system's efficiency reached almost 100% for CIB and 97% for HCHs. The system meets the conditions of Sustainable Resilient Remediation (SRR), as demonstrated by comparing classical wastewater treatment plans and no-intervention scenarios, by reducing the negative environmental impacts of HCH waste, maximizing social and economic benefits, and creating resilience to growing threats. The assessment is based on applying a socio-economic survey framework using 2020 SuRF-UK guidance and a lifecycle assessment using SimaPro software.
YouTube video: https://www.youtube.com/watch?v=wHogF06MQHw
Slides: https://www.pnnl.gov/sites/default/files/2023-11/Remplex%20Submission%2074%20%20269.pdf

ENVIRONMENTAL REMEDIATION AND SITE REVITALIZATION PLANNING AT A COMPLEX NUCLEAR SITE USING A MULTI-ATTRIBUTE PRIORITIZATION TOOL

Robitaille, L. | Pacific Northwest National Laboratory RemPlex seminar, 90 minutes, 2023

The CHALKboard prioritization tool was developed to help determine which remedial actions will provide the greatest benefit at the Chalk River Laboratories (CRL), a nuclear facility with more than 60 Areas of Potential Environmental Concern requiring characterization, including radiological waste management areas, conventional waste landfills, firing ranges, and R&D facilities. The tool considers a dozen different attributes. Rather than relying on judgmental scoring or default values, it 1) assigns scores based upon real, verifiable data and conditions such as radiological or non-radiological contaminant concentrations in soil or groundwater; 2) considers contaminant migration, radiological decay, physical conditions, existing controls such as groundwater treatment systems, engineered barriers, short and long-term costs, and other factors potentially influencing human and ecological risk; 3) introduces unique attributes, such as the redevelopment potential of various brownfield sites; and 4) considers the most significant socio-economic factors as identified by CRL's Community Advisory Panel members and stakeholders, including the compatibility of proposed actions on Indigenous values and needs. A figure presenting the parameter scoring demonstrates the most critical attributes at each location, including which facilities offer the greatest redevelopment potential. It allows for a quick, high-level evaluation of different remedial action scenarios, such as comparing the benefit of source removal versus in situ disposal, and also serves as an effective communication tool for senior management, regulators, and stakeholders.
YouTube video: https://www.youtube.com/watch?v=wHogF06MQHw
Slides: https://www.pnnl.gov/sites/default/files/2023-11/Remplex%20Submission%2039%20%20424.pdf

Demonstrations / Feasibility Studies

APPLICATION OF NOVEL NANOBUBBLE-CONTAINED ELECTROLYZED CATALYTIC WATER TO CLEANUP PETROLEUM-HYDROCARBON CONTAMINATED SOILS AND GROUNDWATER: A PILOT-SCALE AND PERFORMANCE EVALUATION STUDY

Ho, W.-S., W.-H. Lin, F. Verpoort, K.-L. Hong, J.-H. Ou, and C.-M. Kao.
Journal of Environmental Management 347:119058(2023)

A novel electrolyzed catalytic system (ECS) was developed to produce nanobubble-contained electrolyzed catalytic (NEC) water to remediate petroleum-hydrocarbon-contaminated soil and groundwater. The ECS applied high voltage (220 V) with direct current using titanium electrodes coated with iridium dioxide. It contains 21 electrode pairs (with a current density=20 mA/cm2) connected in series to significantly enhance the hydroxyl radical production rate. Iron-copper hybrid oxide catalysts were laid between each pair to improve the radical generation efficiency. Electron paramagnetic resonance and Rhodamine B methods were applied to determine the generated radical species and concentration. High nanobubble concentrations (nanobubble density 3.7×109 particles/mL) were produced during operation due to the cavitation mechanism. The negative zeta potential and nano-scale characteristics (mean diameter 28 nm) allow the repelling force to prevent bubble aggregations and extend their lifetime in NEC water. The radicals produced after the bursting of the nanobubbles are beneficial for the increase of the radical concentration and subsequent petroleum hydrocarbon oxidation. The highly oxidized NEC water (oxidation-reduction potential = 887 mV) can be produced with a radical concentration of 9.5×10-9 M. The pilot study used the prototype system to clean up petroleum-hydrocarbon-contaminated soil at a diesel-oil spill site via an onsite slurry-phase soil washing process. Total petroleum hydrocarbon (TPH)-contaminated soil was excavated and treated with the NEC water in a slurry-phase reactor. Up to 74.4% of TPH (initial concentration 2,846 mg/kg) were removed from the soil after four rounds of NEC water treatment (soil and NEC water ratio for each batch = 10 kg: 40 L and reaction time = 10 min). One remediation well (RW) and two monitor wells were installed along the groundwater flow direction within the petroleum-hydrocarbon plume. The NEC water was injected into the RW; groundwater TPH concentrations (initial concentrations = 12.3-15.2 mg/L) were assessed in the wells. Compared to the control well, TPH concentrations dropped to < 0.4 (RW) and 2.1 mg/L (MW1) after 6 m^3 of NEC water injection. Results indicate that the NEC water could effectively remediate TPH-contaminated soil and groundwater without secondary pollution production. The main treatment mechanisms included (1) in situ chemical oxidation via produced radicals, (2) desorption of petroleum hydrocarbons from soil particles due to the dispersion of nanobubbles into soil pores, and (3) enhanced TPH oxidation due to produced radicals and energy after nanobubble bursting.

PERSULFATE ACTIVATED WITH CALCIUM PEROXIDE TO REMEDIATE RAFT SOIL CONTAMINATED WITH DIESEL IN ARCTIC NORTHERN VILLAGES: ON-SITE PILOT SCALE STUDY

Vincent, T., M. Richard, P. Louis-Cesar, B. Jean-Francois, and M. Guy.
Environmental Technology 45(12):2402-2416(2024)

The remediation efficiency of sodium persulphate (SPS) alkali-activated with calcium peroxide (CP) to degrade diesel from Arctic raft soil was assessed in a pilot study conducted in a northern Canadian village. Due to overall process reactions, a minimum temperature increase in the subsurface was required. In addition, an application that preserved the integrity of the remaining permafrost was imperative. The test was performed using two buried soil columns of 370 L, contaminated with 7,500 mg diesel/kg representative raft soil and matured for 11 months. Over 33 days, the oxidizing solution was continuously delivered by gravity and in a static state. SPS concentration, pH, and temperatures were monitored during treatment. SPS was activated before its distribution; activation by-products were confined in a surficial tank in a sludge form. The maturation period resulted in natural attenuation of diesel (47%) that occurred in the shallower horizons of the soil profile, with the remaining ~ 35% of the diesel after the maturation period removed by chemical oxidation during operation. The temperature increase during the activation process was insignificant— the temperature increase due to diesel degradation by oxidation in the subsurface was below 3° C. The by-products did not clog the soil columns, as indicated by hydraulic testing before and after oxidizing treatment.

PHOTO-BIOELECTROCHEMICAL FACILITATED BIOREMEDIATION OF PETROLEUM-IMPACTED GROUNDWATER AT A REMOTE SITE IN ALASKA

Jin, S. | AEHS Foundation 33rd Annual International Conference on Soil, Water, Energy, and Air, 18-21 March, San Diego, CA, 30 slides, 2024

An E-Redox bioelectrochemical remediation technology was selected for a pilot test at a former U.S. FAA flight service station in Tanana, Alaska, with a history of subsurface petroleum hydrocarbon contamination from former residential heating oil tanks. Photochemical enhancements were integrated into the system to enhance the technology's performance. By creating electron "holes" at the electrode-water interface, the photochemical enhancement promotes electron transfer, increasing the rate of microbial degradation of contaminants. The field pilot test included four E-Redox systems installed in wells. Data from electrical voltage measurements and groundwater sampling was conducted to evaluate the biodegradation rate for diesel range organics indicate a substantial decrease in DRO. https://www.xcdsystem.com/AEHS/abstract/File23293/PDFforhandouttoattendeesopt_186_0329120152.pdf

Research

EXPERIMENTAL UPSCALING ANALYSES FOR A SURFACTANT-ENHANCED IN-SITU CHEMICAL OXIDATION (S-ISCO) REMEDIATION DESIGN

Herzog, B.M., S.M. Kleinknecht, C.P. Haslauer, and N. Klaas.
Journal of Contaminant Hydrology 258:104230(2023)

Scientific investigations are needed to enable the technology transfer for potential field applications of surfactant-enhanced in situ chemical oxidation (S-ISCO) based on developing a remedial design under well-defined boundary conditions. Experimental upscaling analyses were performed using the special infrastructure of the Research Facility for Subsurface Remediation (VEGAS). Batch tests showed that oxidation of the E-Mulse 3® (EM3) selected surfactant by activated persulfate (Na-PS) reduced the solubilization of the model contaminants 1,4-DCB, naphthalene, and PCE. Contaminant solubilization and degradation processes were temporally and spatially separated in the developed remediation design. A proof of concept was provided by performing an S-ISCO medium-scale experiment (100 cm x 70 cm x 12.5 cm) with 1,2-DCB as a model DNAPL contaminant. A groundwater circulation well (GCW) was used to inject a 60 g/L Na-PS solution and effectively mix the reagents. Sampling the outflow and the soil material after treatment showed that neither rebound effects nor residual mass loadings on the soil could be detected after treatment. To further evaluate the S-ISCO remediation design under field-like conditions, a large-scale S-ISCO experiment was conducted (6 m cx 3 m x 1 m) to allow for an extensive sampling campaign to monitor relevant processes. Efficient contaminant removal from the former source zone was achieved by surfactant solubilization, decreasing 1,2-DCB contaminant levels from initially > 2,000 mg/L to < 5 mg/L. The heterogeneously distributed contaminant degradation, implemented by a three-filter GCW, was attributed to density-induced migration processes that impeded an optimal reaction zone. A density-dependent numerical transport qualitatively matched observations. Comparing different simulation scenarios established an adapted GCW operation that provides a more efficient distribution of the density-influenced oxidant injection.

PREDICTING PFAS AND HYDROPHILIC TRACE ORGANIC CONTAMINANT TRANSPORT IN BLACK CARBON-AMENDED ENGINEERED MEDIA FILTERS FOR IMPROVED STORMWATER RUNOFF TREATMENT

Pritchard, J.C., Y.-M. Cho, K.M. Hawkins, S. Spahr, C.P. Higgins, and R.G. Luthy.
Environmental Science & Technology 57(38):14417-14428(2023)

This study builds on a prior lab-based column study investigating biochar and regenerated activated carbon (RAC) amendment to remove hydrophilic trace organic contaminants (HiTrOCs) and PFAS from stormwater runoff. A robust contaminant transport model framework incorporating time-dependent flow and influent concentration was developed and validated to predict HiTrOC and PFAS transport in biochar- and RAC-amended stormwater filters. Parameters fit using a sorption-retarded intraparticle pore diffusion transport model were validated using data further along the depth of the column and compared to equilibrium batch isotherms. The transport model and fitted parameters were then used to estimate the lifetime of a hypothetical stormwater filter in Seal Beach, California, to be 35 ± 6 years for biochar- and 51 ± 17 years for RAC-amended filters under ideal conditions with no filter clogging. The work offers insights into the kinetics of HiTrOC and PFAS transport within biochar and RAC filters and the impact of filter design on contaminant removal performance and longevity.

VADOSE ZONE SOIL FLUSHING FOR CHROMIUM REMEDIATION: A LABORATORY INVESTIGATION TO SUPPORT FIELD-SCALE APPLICATION

Szecsody, J.E., H.P. Emerson, A.R. Lawter, C.T. Resch, M.L. Rockhold, R.D. Mackley, and N.P. Qafoku. l Groundwater Monitoring & Remediation 43(2):34-50(2023)

A lab study was conducted to provide the technical basis for designing a field soil flushing strategy for Cr(VI). The objectives were to quantify the relationship between sediment Cr(VI) and Cr(III) mass and release rates and subsequent Cr(VI) leaching, investigate different methodologies to maximize Cr(VI) leaching and investigate methods to minimize leaching of remaining residual Cr. Characterization of Cr-contaminated sediments (Hanford Site, WA) showed leaching rates were correlated to different Cr surface phases. Sediments with low-leachable Cr(VI) (
https://ngwa.onlinelibrary.wiley.com/doi/epdf/10.1111/gwmr.12570

REMOVAL OF PER- AND POLYFLUOROALKYL SUBSTANCES BY ANION EXCHANGE RESINS: SCALE-UP OF RAPID SMALL-SCALE COLUMN TEST DATA

Cheng, L. Amd D.R.U. Knappe. l Water Research 249:120956(2024)

This research aimed to predict PFAS removal in full- or pilot-scale packed-bed anion exchange (IX) resin contactors from rapid small-scale column test (RSSCT) data. Specific objectives were to assess the effects of IX resin crushing on total anion exchange capacity and packed bed density; determine initial PFAS concentration effects on PFAS uptake capacity; determine the rate-limiting step controlling PFAS uptake kinetics; determine the effects of hydraulic loading rate on PFAS uptake capacity; and link constant diffusivity RSSCT data to pilot test data to develop a scale-up protocol. Experiments were conducted with two single-use IX resins and three water matrices, including coagulated surface water and groundwater. Crushing IX resin did not substantially change the bed density and total anion exchange capacity, but the particle morphology changed from almost perfectly spherical to irregularly shaped. PFAS uptake capacity was independent of influent PFAS concentrations in the 30-300 ng/L range; this finding facilitated the development of an RSSCT scale-up, as influent PFAS concentrations in RSSCTs and corresponding pilot tests often differ. Biot number values and data from interrupted RSSCTs demonstrated that film diffusion or a combination of film and intraparticle diffusion controls the PFAS uptake rate by IX resins. PFAS uptake capacity was a function of the square root of the product of Sherwood number and particle shape factor ($\sqrt{Sh \times \Phi}$) in RSSCTs with identical empty bed contact times but different hydraulic loading rates (v_f). A constant diffusivity RSSCT design with a reduced v_f can be used to predict full- or pilot-scale PFAS breakthrough data by multiplying the bed volumes of water treated in the RSSCT by a factor of $\sqrt{(Sh_{pilot} \times \Phi_{pilot})/(Sh_{RSSCT} \times \Phi_{RSSCT})}$.

CONCENTRATIONS OF 45 PER- AND POLYFLUOROALKYL SUBSTANCES IN NORTH AMERICAN RIVER OTTERS (*LONTRA CANADENSIS*) FROM WEST VIRGINIA, USA

Li, Z.-M., A. Roos, T.L. Serfass, C. Lee, and K. Kannan.
Environmental Science & Technology 58(4):2089-2101(2024)

A study measured 45 PFAS in various tissues of 42 river otters collected from several West Virginia watersheds. The median concentrations of ∑45 PFAS varied among tissues in the following decreasing order: liver (931 ng/g wet weight) > bile > pancreas > lung > kidney > blood > brain > muscle. PFSAs were predominant, accounting for 58-75% of the total concentrations, followed by PFCAs (21-35%). 8:2 FTS, 10:2 FTS, and 6:2 chlorinated polyfluoroalkyl ether sulfonate were frequently found in the liver (50-90%) and bile (96-100%), whereas hexafluoropropylene oxide dimer acid (HFPO-DA) was rarely found. The hepatic concentrations of ∑45 PFAS in river otters collected downstream of a fluoropolymer production facility along the Ohio River were 2-fold higher than in other watersheds. The median whole-body burden of ∑45 PFAS was 1,580 μg. PFOS and PFOA concentrations in the whole blood of some river otters exceeded the human toxicity reference values, which warrants further studies.

FOUR YEARS OF ACTIVE SAMPLING AND MEASUREMENT OF ATMOSPHERIC POLYCYCLIC AROMATIC HYDROCARBONS AND OXYGENATED POLYCYCLIC AROMATIC HYDROCARBONS IN DRONNING MAUD LAND, EAST ANTARCTICA

Overmeiren, P.V., K. Demeestere, P. De Wispelaere, S. Gili, A. Mangold, K. De Causmaecker, N. Mattielli, A. Delcloo, H. Van Langenhove, and C. Walgraeve.
Environmental Science & Technology 58(3):1577-1588(2024)

PAHs and oxygenated (oxy-)PAHs were sampled from the atmosphere during four austral summers from 2017 to 2021 at the Princess Elisabeth station in East Antarctica, which is isolated from other stations and activities and has limited local pollution. A high-volume sampler was used to collect the gas and particle phase (PM 10) separately. Concentrations of fifteen PAHs and 12 oxy-PAHs quantified

ranged between 6.34 and 131 pg m^3 (Σ_{15}PAHs-excluding naphthalene) and between 18.8 and 114 pg m^3 (Σ_{13}oxy-PAHs) were detected. Phenanthrene, pyrene, and fluoranthene were the most abundant PAHs. The gas-particle partitioning coefficient log(K_p) determined for six compounds was between 0.5 and -2.5. Positive matrix factorization modeling was applied to the data set to determine the contribution of different sources to the observed concentrations. A 6-factor model proved a good fit to the data set and showed strong variations in the contribution of different air masses. During the sampling campaign, volcanic eruptions occurred in the southern hemisphere from which the emission plume was detected. The FLEXPART dispersion model confirmed that volcanic eruptions influenced the recorded signal. The data was used to derive a transport time of between 11 and 33 days from release to arrival at the measurement site in Antarctica.

General News

EVALUATION AND REVIEW OF BEST MANAGEMENT PRACTICES FOR THE REDUCTION OF POLYCHLORINATED BIPHENYLS TO THE CHESAPEAKE BAY

Needham, T.P., E. Majcher, E. Foss, and O.H. Devereux. USGS Scientific Investigations Report 2023-5074, 26 pp, 2024

This review focuses on PCB reduction practices and BMPs to assist management decision-making and provide information on the current state of the science. Studies have quantitatively demonstrated the efficacy of green infrastructure BMPs and gray infrastructure improvements to reduce PCB loads, and other studies have demonstrated qualitative reductions for other BMP types. The review also highlights the disconnect between PCB load reduction and PCB bioavailability when selecting a remediation strategy, evaluates modeling approaches to assess PCB load reduction to inform management decisions, and suggests reasons why there are still significant barriers to implementation. https://pubs.usgs.gov/sir/2023/5074/sir20235074.pdf

THE EPA ECOSYSTEM SERVICES TOOL SELECTION PORTAL

Harwel, M.C., L.M. Sharpe, K. Hines, C. Schumacher, S. Kim, G. Ferreira and T.A. Newcomer-Johnson. I Sustainability 16(5):1739(2024)

The EPA Ecosystem Services (ES) Tool Selection Portal (https://www.epa.gov/eco-research/ecosystem-services-tool-selection-portal) was developed to help users navigate how to choose among a suite of ecosystem services assessment tools for ecological risk assessments, cleanup of contaminated sites, and generic structured decision-making processes. The tool selection navigator was developed with/for the intended user and includes crosswalks between tool functionality and the user's language for what they require in a tool. The tool uses simple language to navigate the decision pathways and provides the user with a suite of potential ES resources and tools for their given decision context. *This article is **Open Access** at* https://www.mdpi.com/2071-1050/16/5/1739.

UNLOCKING ENVIRONMENTAL INSIGHTS: NEXT GENERATION SEQUENCING APPLICATIONS IN GROUNDWATER REMEDIATION, BIOAUGMENTATION, AND EDNA ANALYSIS

Druar, X. I SMART Remediation, 8 February, Ottawa, Canada, 24 slides, 2024

Next-generation sequencing (NGS) technology allows rapid DNA sequencing of full genomes or specific targeted regions. In this presentation, we will highlight how NGS can provide environmentally relevant information for enhanced in situ groundwater remediation, the characterization of microbial cultures used in bioaugmentation, and the characterization of water associated non-microbial fauna using eDNA approaches. Characterization of microbial communities in groundwater for in situ groundwater remediation is routinely performed with NGS. Common uses include determining the potential for natural attenuation and assessing the need for and impacts of enhanced bioremediation. Examples of NGS data for chlorinated solvent and hydrocarbon-contaminated sites demonstrated how NGS enhanced understanding of bioremediation processes and the subsurface conditions. NGS can also characterize aquatic flora and fauna through environmental "eDNA" analysis methods. These methods can also be used to screen sites for the presence of fish, amphibians, aquatic insects, and even birds and mammals associated with aquatic systems. Overall, there are numerous applications where high-throughput sequencing technology can allow stakeholders to better understand the organisms living in or interacting with a site throughout the characterization and remediation process.
https://smartremediation.com/wp-content/uploads/2024/03/SMART-Ottawa-Ximena-Druar-%E2%80%93-February-8-2024.pdf

EXTRACTION AND INJECTION METHODS FOR CHLORINATED AND RECALCITRANT COMPOUNDS: APPLICATIONS AND ENHANCEMENTS FOR GROUNDWATER AND SOIL REMEDIATION

Pehlivan, M., J. Depa, A. Mensen, E. Batlle, and D. Jahn. I AEHS Foundation 33rd Annual International Conference on Soil, Water, Energy, and Air, Workshop 2, 18-21 March, San Diego, CA, 224 slides, 2024

This remediation workshop is intended for project managers, consultants, geologists, hydrogeologists, engineers, and others who perform or evaluate different cleanup techniques. The workshop explains how remediation systems involving extraction or injection work in the subsurface and how to optimize systems for maximum efficiency. The workshop covers:

1. Introduction and history of pump and treat and vacuum-driven extraction methods, soil vapor extraction (SVE), two-phase extraction (TPE), dual phase extraction (DPE), and multi-phase extraction (MPE), air, ozone and propane sparging methods, in situ chemical oxidation (ISCO), in-situ enhanced bioremediation (EISB) with or without bioaugmentation, in-situ abiotic remediation using zero-valent iron (ZVI) injection, optimizing injection and extraction methods, an overview of PFAS remediation alternatives, and emerging technologies for PFAS remediation.
2. SVE/TPE/MPE applications – how to set up a pilot test, estimate well flows from soil permeability data, perform a reality check on calculation, and estimate the radius of influence (ROI)/zone of influence (ZOI) and removal rates, how to monitor in situ bioremediation during SVE, intermittent or continuous operation, what is a reasonable rebound time on SVE, designing a drop tube for maximum water, vapor flow, and water lift for TPE. An introduction, comparative evaluation, and optimization for in-well stripping and recirculation methods.
3. Electronic field data collection, analysis and reporting, remediation progress evaluation, endpoint determination, remediation hydraulics, and effective porosity vs mobile porosity.
4. In situ injection methods, ISCO, EISB, ZVI injection, estimating /calculating dosage, implementing advanced site characterization tools and 3D statistical modeling to optimize remediation design, pre-, during and post-injection monitoring. Tools of the trade, what worked best and what did not.
5. An overview of PFAS remediation alternatives: anion exchange, granular activated carbon, reverse osmosis, supercritical water oxidation, and other emerging remediation methods.

Case studies are presented for each remediation alternative.
https://www.xcdsystem.com/AEHS/abstract/File23293/PDFforhandouttoattendeesopt_198_0315053305.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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