Technology Innovation News Survey

Entries for February 1-15, 2023

Market/Commercialization Information

FY23 CAROLINA GROUP OPTIMIZED REMEDIATION CONTRACT (SOL)

U.S. Army Corps of Engineers, South Atlantic Division, Savannah, GA
Contract Opportunities on SAM.gov, Solicitation W912HN23R1000, 2023

This is a total small business set-aside under NAICS code 562910. The U.S. Army Corps of Engineers, South Atlantic Division, seeks a contractor to perform environmental remediation activities at Joint Base Charleston-Air (JBCA), Joint Base Charleston-Weapons (JBCW), and North Auxiliary Airfield (NAAF) in South Carolina; and Seymour Johnson Air Force Base (SJAFB), in North Carolina. The activities include maintenance of established remedies, optimization at applicable sites, and achievement of site-specific objectives. The Contractor shall undertake environmental remediation activities to achieve performance objectives at 54 Installation Restoration Program (IRP) sites and 11 Military Munitions Response Program (MMRP) sites. The award will be a fixed-price contract with a one-year base period and nine one-year option periods. Proposals are due by 1:00 PM EDT on March 27, 2023.
https://sam.gov/opp/69998963b35b4196bd56c63248bc84d6/view

REGION 3 CERCLA ENVIRONMENTAL SERVICES (COMBINE)

U.S. Department of Agriculture Forest Service, Southwestern Regional Office, Region 3, Albuquerque, NM
Contract Opportunities on SAM.gov, Solicitation 127EAV23R0002, 2023

This is a total small business set-aside under NAICS code 562910. The U.S. Department of Agriculture, Forest Service, Region 3, requires technical services for site response activities. This includes conducting various evaluations and studies, and preparing reports as specified in the National Contingency Plan (NCP) found in 40 CFR 300 or as required by the RCRA or other federal or state hazardous waste cleanup regulations. The Contractor may be requested to complete the following studies; Phase I Environmental Site Assessments; Preliminary Assessments (Pas), Site Inspections (SIs), combined PA/SIs, Potentially Responsible Party Searches, Risk Assessments, an Engineering Evaluation/Cost Analysis, a Remedial Investigation/Feasibility Study, or other documents required for CERCLA response actions, including enforcement support. The Contractor also may be requested to implement the CERCLA site remedy in accordance with the NCP with approved work plans and decision documents. Work under this contract is broken into the following seven work activities/areas: Site Assessment/Characterization; Removal Action Support; Removal Action Implementation; Remedial Action Support; Remedial Action Implementation; Enforcement Support; and Other Technical Support and Assistance. Proposals will be evaluated using a Best Value Trade-Off source selection process. It is envisioned that most of the projects in all activity areas will involve abandoned/inactive mine sites, shooting ranges, dumps, landfills, and land adjustments (acquisitions/conveyances). Projects may be located anywhere throughout the Forest Service's Southwestern Region (Region 3). Region 3 includes six national forests in Arizona, five national forests in New Mexico, and, as part of the Cibola National Forest, three national grasslands, one each in Northeastern New Mexico, Western Oklahoma, and Northwest Texas. Some of the work may encompass private land adjacent to national forest lands. The contract will be a multiple-award, firm-fixed-price CERCLA Environmental Services Indefinite Delivery/Indefinite Quantity (IDIQ) contract with a period of performance of five years from contract award. Offers are due by 4:00 PM MDT on March 27, 2023.
https://sam.gov/opp/9c4521a589ea4ed5a1a821f429a36a38/view

SOLICITATION - W9128F22R0023 - $35M SATOC - 8A SET-ASIDE (SOL)

U.S. Army Corps of Engineers, Northwestern Division, Omaha District, Omaha, NE
Contract Opportunities on SAM.gov, Solicitation W9128F22R0023, 2023

This is an 8(A) set-aside under NAICS code 562910. The U.S. Army Corps of Engineers requires a contractor to support the Rapid Response Program, Environmental Remediation Services (ERS) and other mission-related support services in the Continental United States, including Alaska and Hawaii, and outlying areas within the South Atlantic Division (SAD) Area of Responsibility (AOR). The successful offeror shall provide a time-sensitive response, environmental response, and/or remediation services at sites within the geographic boundaries of the contracts in accordance with the scope of this contract. The award will be an Indefinite Delivery/Indefinite Quantity (IDIQ) Single Award Task Order Contract (SATOC) with firm-fixed-price or cost reimbursement task orders. The majority of the task orders that will be issued under this contract will provide services related to requirements of RCRA, CERCLA, EPA Emerging Contaminate Program; the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Military Munitions Response Program (MMRP), the Clean Water Act, the Clean Air Act, National Environmental Policy Act (NEPA), National Historic Preservation Act, Endangered Species Act and other related Federal Programs in addition to state- and local-specific regulations/requirements dealing with hazardous waste management/disposal, radioactive waste/mixed waste management/disposal, and with Underground Storage Tanks (USTs), and other fuels related issues. Actions may address both regulated and non-regulated toxic substances and emerging contaminants. Incidental construction (for example, excavation/removal of contaminated soil, off-site disposal of contaminated soil, installation of treatment systems, etc.) will also be included in this contract; however, construction activities will be incidental to the remediation effort. Offers are due by 2:00 PM CDT on April 10, 2023.
https://sam.gov/opp/7a6a840eec384b8b872ef043c4cdee8c/view

Cleanup News

CLIMATE ADAPTATION PROFILE: ALLEN HARBOR LANDFILL, DAVISVILLE NAVAL CONSTRUCTION BATTALION CENTER (NCBC)

EPA website, February 2023

EPA recently released a climate adaptation profile describing measures taken at the Allen Harbor Landfill near North Kingstown, Rhode Island. The remedy involved constructing a multimedia cap above consolidated waste materials

associated with past NCBC operations, including disposal of materials such as construction debris, solvents, and waste fuel. The site is vulnerable to erosion and overland runoff due to storm surge, tidal force, and wave action of Allen Harbor on the western shore of Narragansett Bay. Vulnerability to these natural forces is exacerbated by sea level rise; a seven-foot rise in sea level is anticipated along North Kingstown within 75-100 years. Design and construction of the capping system included multiple measures to address the vulnerabilities, such as designing the cap to reach an elevation higher than the feasibility study criteria. A stone revetment and breakwater structure were constructed along the length of the capped landfill's shoreline to protect the landfill cover surfaces from erosion during tidal rise and storm surges. Additionally, a two-acre strip of intertidal wetland containing saltwater-tolerant plants was restored between the revetment and breakwater structure to further reduce erosive effects of localized wave action.
https://www.epa.gov/superfund/climate-adaptation-profile-allen-harbor-landfill

REMEDIATION OF THE ALLUVIAL AQUIFER OF THE SARDAS LANDFILL (SABINANIGO, HUESCA) BY SURFACTANT APPLICATION

Guadano, J., J. Gomez, J. Fernandez, D. Lorenzo, C.M. Domínguez, S. Cotillas, R. Garcia-Cervilla, and A. Santos. | Sustainability 14(24):16576(2022)

The Sardas Landfill at Sabinanigo Huesca is contaminated with DNAPLs composed of a complex mixture of chlorinated organic compounds (COCs) produced as liquid waste from lindane production being dumped in unlined landfills. DNAPL migrated by gravity through the subsurface and accumulated in the contact between the alluvial and marls layers (~15 m bgs). Seven injections of E-Mulse 3®, an aqueous emulsion of a biodegradable nonionic surfactant, were conducted in the most contaminated areas of the Sardas alluvial. Surfactant concentrations of 6.7, 20, 25 and 50 g/L, 0.2 to 7 m^3 injection volumes, and 0.08-0.85 m^3/h injection flow rates were used in the injections. The time between surfactant injection and extraction varied between 24 and 72 h. A total of 22 m^3 were injected into the alluvial, and more than double this amount was extracted from the same well or surrounding wells. Injection and extraction points were in contact between the marls and the alluvial layer. Recovered DNAPL was mobilized rather than solubilized and managed as toxic waste. The aqueous supernatant was treated in a wastewater treatment plant via physicochemical treatment before discharge. Injected fluid transport, monitored by conductivity profiles using bromide (260-538 mg/L) as a conservative tracer, showed high radial dispersion. Surfactant losses by adsorption in the alluvial and absorption in DNAPL were observed, and both the surfactant and the contamination were contained within the capture zone. Groundwater monitoring showed a significant reduction of COCs in the treatment zone following injections. *This article is* ***Open Access*** *at* https://www.mdpi.com/2071-1050/14/24/16576.

OFFSITE PERMEABLE REACTIVE BARRIERS AND ON-SITE RESIDUAL SOURCE CONTROL: A HOLISTIC, LOW-COST SOLUTION TO A 1,2-DCA PROBLEM

Vanderglas, B. and D. Griffiths. | Pearson webinar, 11 January, 63 minutes, 2023

Remediation activities, including excavating vadose zone source area soils and pump-and-treat to remove residual contaminant mass below the water table, were conducted at a 1,2-DCA-contaminated industrial site in Texas. Subsequent investigations identified a 4,000-foot-long 1,2-DCA plume extending offsite below underdeveloped and undeveloped properties. Enhanced bioremediation permeable reactive barriers (PRBs) and two hydraulic containment systems were installed within the offsite plume to prevent plume migration and accelerate offsite plume collapse. A high-resolution source area characterization project was conducted to locate residual source mass in 3-D to actualize a more aggressive source area remedy and reduce the remedial timeframe. Within seven years of enhanced bioremediation PRB implementation, the offsite plume footprint had shrunk >50%, and 11 previously impacted offsite properties were restored. https://www.youtube.com/watch?v=u6xBKNEWb6I

DESIGN AND IMPLEMENTATION OF A SOURCE CONTROL PROGRAM FOR PFAS AT THE FIRE FIGHTING TRAINING AREA (FFTA), CFB COMOX, COMOX BC

Torney, K. | REMTECH 2022: The Remediation Technologies Symposium, Banff, AB, Canada, 11-14 October. Environmental Services Association of Alberta, Edmonton, AB (Canada), 20 slides, 2022

A project was developed to address risks from PFAS source materials at the firefighting training area (FFTA) at CFB Comox, Lazo, BC. Prior use of firefighting foams resulted in PFAS concentrations above regulatory standards in multiple media, including downstream surface water. Remediation was expedited to reduce PFAS concentrations in site discharges and replace the FFTA infrastructure. The scope of work included source control and design, construction, excavation, soil management, and restoration. Infrastructure needs, site constraints, PFAS treatment technologies including, novel in situ and ex situ options, and project logistics, including CFB Comox and environmental remediation requirements, were evaluated. The chosen strategy focused on source control that targeted excavation of the highest concentration materials. Excavated soil was either thermally treated or stabilized with amendments and reused onsite. Site-specific soil remedial objectives were developed to support decision-making to identify soil for offsite thermal treatment/disposal and soil for stabilization/onsite reuse. In the final design, a bioswale directs stormwater to the site drainage system. FFTA training water is captured and directed to storage tanks through a valve system to facilitate water quality testing. Project challenges included contaminant class segregation and geo-referencing; thermal treatment processes; stabilization and reuse methodology; FFTA civil works, and logistics related to airport operations. ***Longer abstract:***
https://esaa.org/wp-content/uploads/2022/09/RT2022-program-Abstracts-30.pdf ***Slides:***
https://esaa.org/wp-content/uploads/2022/11/RT22Torney.pdf

Demonstrations / Feasibility Studies

HYDROXYL-RADICAL BASED ADVANCED OXIDATION PROCESSES CAN INCREASE PERFLUOROALKYL SUBSTANCES BEYOND DRINKING WATER STANDARDS: RESULTS FROM A PILOT STUDY

Venkatesan, A.K., C.-S. Lee, and C.J. Gobler.
Science of The Total Environment 847:157577(2022)

The fate of PFASs in seven pilot-scale advanced oxidation processes (AOPs), including UV/H_2O_2, UV/Cl_2, UV/TiO_2, and O_3/H_2O_2 technologies, was assessed at four drinking water systems across New York State. Seven of 18 PFAS were detected in the influent at concentrations ranging from below method detection to 64 ng/L. All detected PFAS showed an increase in concentration after treatment, presumably due to unknown precursor transformation with specific increases for PFBS, PFHxA, PFHpA, PFHxS), PFOA, PFOS, and PFNA averaging 405% (range: 0-1,220%), 1.0% (-7-9%), 3.8% (0-9.5%), 3.3% (-11-13%), 14% (0-48%), 13% (3-25%), and 2% (0-5.2%), respectively. PFAS concentration increases depended on UV and oxidant dose, confirming that transformation reactions occurred due to AOPs similar to a total oxidizable precursor assay. At one site, PFOA levels exceeded the current regulatory drinking water standard of 10 ng/L after but not before treatment, highlighting the importance of considering the potential impact of AOP on treated water quality when designing treatment systems for regulatory compliance. The increase in PFAS concentration in the AOP systems positively correlated (r = 0.91) with nitrate levels in groundwater, suggesting that onsite septic discharges may be an important source of PFAS contamination in these unsewered study areas. Results reveal that hydroxyl radical-based AOPs, although ineffective in treating PFAS, can help reveal the extent of

PFAS contamination in source waters.

INNOVATIVE REUSE AND BENEFICIAL USE EVALUATION AND DEMONSTRATION PROJECT REPORT (RE02) CONOWINGO SEDIMENT CHARACTERIZATION AND INNOVATIVE REUSE AND BENEFICIAL USE PILOT PROJECT

Northgate Environmental Management, Inc. for Maryland Environmental Service, 504 pp, 2022

The Conowingo Sediment Characterization and Innovative Reuse and Beneficial Use Pilot Project contains two main components: 1) the Sediment Characterization Study of the Conowingo Reservoir (Reservoir), and 2) the Innovative Reuse and Beneficial Use Evaluation and Demonstration Project (IR/BU Evaluation). This report summarizes the IR/BU Evaluation activities and presents the results, including findings from the sediment stockpile sampling, IR bench-scale testing, water quality impact modeling, and a market and economic market analysis of IR/BU options. The objectives of the evaluation were to:

- Assess the physical and chemical characteristics of dredged sediment from a specific dredging area identified for bench-scale testing and the field demonstration;
- Assess the suitability of the dredged sediment and/or sediment from cores collected as part of the sediment characterization study for various potential IR/BU end uses based on lab and bench-scale testing;
- Demonstrate the feasibility of using sediment from the Reservoir in the implementation of a field-scale test for a selected end use;
- Evaluate the regulatory, logistic, and economic considerations of implementing a large-scale sediment IR/BU program; and
- Provide data and analysis supporting future predictive modeling to inform decision-making regarding sediment removal and management.

Findings of the evaluation were used to evaluate the effectiveness of various sediment removal/reuse scenarios from a cost perspective and will inform future decisions on sediment management in the Reservoir.
https://mde.maryland.gov/programs/marylander/Documents/IRBU%20Report.pdf

A DATA-DRIVEN MODELING APPROACH FOR THE SUSTAINABLE REMEDIATION OF PERSISTENT ARSENIC (AS) GROUNDWATER CONTAMINATION IN A FRACTURED ROCK AQUIFER THROUGH A GROUNDWATER RECIRCULATION WELL (IEG-GCW®)

Ciampi, P., C. Esposito, E. Bartsch, E.J. Alesi, G. Rehner, P. Morettin, M. Pellegrini, S. Olivieri, M. Ranaldo, G. Liali, and M.P. Papini. | Environmental Research 217:114827(2023)

An innovative remediation technology was implemented to remove As from a heavily contaminated, fractured aquifer at an industrial site. Groundwater circulation well (GCW) technology was tested to significantly increase and accelerate the mobilization and removal of As in the source area. A 45-m deep IEG-GCW® system was installed, equipped with four screen sections at different depths and a treatment system for removing As by oxidation and filtration on Macrolite. A geomodeling approach supports both remediation and multi-source data interpretation. The first months of operation demonstrate the hydraulic effectiveness of the IEG-GCW system in the fractured rock aquifer and the ability to significantly enhance As removal compared to conventional pumping wells currently feeding a centralized treatment system. The recirculation flow rate amounts to ~ 2 m^3/h. Water pumped and treated by the GCW system is reintroduced with As concentrations reduced (average of 20%-60%). During the pilot test, the recirculating system removed 23 kg As, while the central pump-and-treat (P&T) system removed 129 kg, although it treated 100 x more water volume. The P&T system removed 259 mg As/m^3 of treated groundwater, while the GCW removed 4,814 mg As per m3 of treated groundwater.

Research

MAPPING AREAS OF GROUNDWATER SUSCEPTIBLE TO TRANSIENT CONTAMINATION EVENTS FROM RAPID INFILTRATION INTO SHALLOW FRACTURED-ROCK AQUIFERS IN AGRICULTURAL REGIONS OF THE CONTERMINOUS UNITED STATES

Shapiro, A.M. and J.A. Falcone, U.S. Geological Survey Open-File Report 2022-1093, 35 pp, 2022

An investigation identified landscape areas underlain by fractured rock within the conterminous U.S. that may be susceptible to rapid infiltration and where groundwater is a principal source of water supply. Instances of rapid infiltration to the water table in fractured-rock aquifers following precipitation or spring snowmelt may lead to intermittent contamination events and a temporary degradation in groundwater quality. The survey also addressed the potential for contaminant longevity in fractured-rock aquifers stemming from intermittent contamination events. Areas of rapid infiltration into fractured rock were identified using index values applied to the attributes most likely to affect rapid infiltration into the water table: (1) depth to the water table, (2) depth to bedrock, and (3) the percentage of sand in soil, where larger index values indicate greater susceptibility to rapid infiltration. The combination of depth to the water table and depth to bedrock highlights those aquifer settings characterized as shallow fractured-rock aquifers, where the water table may reside either in the bedrock or in overlying unconsolidated geologic materials. In addition, the percentage of agricultural use as a land-use attribute was considered. The indices from the landscape attributes and land-use conditions were combined to identify an index of susceptibility for rapid infiltration and contamination. https://pubs.usgs.gov/of/2022/1093/ofr20221093.pdf

ANALYSIS OF CHRYSOPOGON ZIZANIOIDES USED AS FLOATING TREATMENT WETLANDS IN THE REMOVAL OF HEAVY METALS PRESENT IN LEACHATE

Alvarez-Ascencio, A., S. Lopez-Martinez, A.R. Rodriguez-Luna, E.S. Lopez-Hernandez, C.M. Morales-Bautista, and E. Hernandez-Nunez. | Remediation 33(1):77-86(2022)

A study evaluated the potential of using *Chrysopogon zizanioides* as floating treatment wetlands to remove As, Cd, Cr, Cu, Fe, Hg, Pb, and Zn from three different concentrations of landfill leachate (100% crude leachate [L100], 75% leachate + 25% tap water [L75], and 50% leachate + 50% tap water [L50]) over 60 days. Heavy metal concentrations in leachate and *C. zizanioides* were analyzed by inductively coupled plasma optical emission spectrometry. Results show that vegetation treatments significantly decreased heavy metal concentrations (p

ENHANCED NATURAL ATTENUATION OF GROUNDWATER CR(VI) POLLUTION USING ELECTRON DONORS: YEAST EXTRACT VS. POLYHYDROXYBUTYRATE

Tumolo, M., A. Volpe, N. 1 Leone, P. Cotugno, D. De Paola, D. Losacco, V. Locaputo, M. Concetta de Pinto, V. Felice

Uricchio, and V. Ancona.
International Journal of Environmental Research and Public Health 19:9622(2022)

A bioremediation test was conducted using viable microcosms set with groundwater and deep soil (4:1) collected from the saturated zone of a Cr(VI)-contaminated (~130 µg/L) industrial site in Southern Italy. Conditions simulating natural attenuation were compared to enhanced natural attenuation induced by supplying yeast extract or polyhydroxybutyrate. Sterile controls were set up to study the possible Cr(VI) abiotic reduction. No pollution attenuation was detected in the unamended viable reactors, whereas yeast extract provided the complete Cr(VI) removal in seven days, and polyhydroxybutyrate allowed ~70% pollutant removal after 21 days. The incomplete abiotic removal of Cr(VI) was observed in sterile reactors amended with yeast extract, suggesting the essential role of native bacteria in Cr(VI) remediation. This agreed with the results of Pearson's coefficient test, which revealed that Cr(VI) removal was positively correlated with microbial proliferation (n=0.724), and also negatively correlated with pH (n= -0.646), dissolved oxygen (n=-0.828) and nitrate (n=-0.940). The relationships between the Cr(VI) removal and other monitored parameters investigated by principal component analysis explained 76.71% of the total variance. https://pdfs.semanticscholar.org/25dc/21be5eaebc7e10f81e3ef91da644ed698151.pdf

ENHANCED PAHS-CONTAMINATED SITE SOILS REMEDIATION BY MIXED PERSULFATE AND CALCIUM PEROXIDE

Tang, L., X. Zhang, Z. Li, F.O. Gudda, M.G. Waigi, J. Wang, H. Liu, and Y. Gao.
Journal of Environmental Management 306:114363(2022)

A study sought to optimize persulfate (PS)/calcium peroxide (CP) oxidation remediation strategy and verify its practical application effect in soil samples spiked with PAHs. The mixed PS/CP oxidation remediation performed better than the single oxidants strategies; showing high remediation performance in different particles and pollution loads of PAHs-contaminated soils. Simultaneously, $SO_4^{\cdot-}$ and ·OH were detected, and CaSO4 was characterized. The study optimized the mixed PS/CP system (0.3 mol/L PS and 8 g/kg CP) with 0.18 mol/L Fe^{2+} and 0.11 mol/L $C_2O_4^{2-}$; the corresponding total PAH removal rate was 85.41%. Results of the study provided a cost-effective mixed PS/CP oxidation remediation technique ($1.22/ton), widely applicable in soils polluted with various organic contaminants represented, such as PAHs.

PERSULFATE-BASED ISCO FOR FIELD-SCALE REMEDIATION OF NAPL-CONTAMINATED SOIL: COLUMN EXPERIMENTS AND MODELING

Bolourani, G., M.A. Ioannidis, J.R. Craig, and N.R. Thomson.
Journal of Hazardous Materials 449:131000(2023)

An experimental and computational investigation of in situ chemical oxidation (ISCO) of weathered diesel fuel in soil columns was conducted to validate a reactive-transport model capable of forecasting contaminant mass reduction from a residual source zone. A phenomenological model of the oxidation of petroleum hydrocarbon (PHC) mixture fractions was used to estimate the kinetic parameters *a priori* using reactivity tests with contaminated groundwater in batch reactors. The transport model, which incorporated groundwater flow, dissolution of main PHC fractions, and homogeneous reaction in the aqueous phase, was subsequently validated against experimental ISCO data in soil columns using repetitive treatments with unactivated and alkaline-activated persulfate. No significant effect of the initial concentration of persulfate on the remediation performance was observed in the batch system; alkaline activation significantly improved performance. The alkaline-activated persulfate treatment achieved ~80% removal of the initial NAPL mass in soil columns. Combining models and experiments should enable the rational design of field-scale advanced oxidation strategies to remove weathered PHCs. This expectation was supported by a comprehensive demonstration study at a site contaminated by weathered diesel fuel present as a residual source within the soil and dissolved within groundwater.

TREATMENT OF A COMPLEX EMULSION OF A SURFACTANT WITH CHLORINATED ORGANIC COMPOUNDS FROM LINDANE WASTES UNDER ALKALINE CONDITIONS BY AIR STRIPPING

Saez, P., R. Garcia-Cervilla, A. Santos, A. Romero, and D. Lorenzo.
Industrial & Engineering Chemistry Research 62(7):3282-3293(2023)

A study investigated treating a complex emulsion composed of a nonionic surfactant and DNAPL, formed from chlorinated organic compounds (COCs) and generated as a lindane production waste, by air stripping under alkaline conditions. The influence of the surfactant (1.5-15 g/L), COC concentrations (2.3-46.9 mmol/L), and temperature (30-60°C) on the COC volatilization was modeled in terms of an apparent constant of Henry at pH >12. Surfactant stability was studied as a function of temperature (20-60°C) and surfactant (2-10 g/L), COC (0-70.3 mmol/L), and NaOH (0-4 g/L) concentrations. A kinetic model was proposed to explain the loss of surfactant capacity (SCL). Results showed that alkali and temperature caused the SCL by hydrolysis of the surfactant molecule. The increasing surfactant concentration decreased the COC volatility, whereas the temperature improved the COC volatilization. Volatilization of COCs in alkaline emulsions by air stripping (3 L/h) was performed to evaluate the treatment of an emulsion composed of the COCs (17.6 mmol/kg) and surfactant (3.5 and 7 g/L). Air stripping was successfully applied to remove COCs (>90%), reaching an SCL of 80% at 60°C after 8 h. Volatilization can remove COCs from emulsions and break them, enhancing their further disposal. https://pubs.acs.org/doi/pdf/10.1021/acs.iecr.2c03722

General News

DEVELOPMENT OF A QUANTITATIVE FRAMEWORK FOR EVALUATING NATURAL ATTENUATION OF 1,1,1-TCA, 1,1-DCA, 1,1-DCE, AND 1,4-DIOXANE IN GROUNDWATER

Danko, A., D. Adamson, C. Newell, J. Wilson, B. Wilson, D. Freedman, and C. Lebron. ESTCP Project ER-201730, 78 pp, 2023

The DoD has developed a screening tool, the MNA Rate Constant Estimator, to simulate the natural attenuation of dissolved compounds in groundwater. The tool helps to evaluate historical monitoring data and to develop lines of evidence supporting MNA as a viable remedial approach. The model is programmed in a spreadsheet format, and a User's Guide provides helpful instructions. The tool incorporates key fate and transport mechanisms and various biotransformation processes. The following modules are included: solute transport of 1,4-dioxane with biotransformation via an oxidative pathway; solute transport of chlorinated ethenes with biotransformation modeled as a sequential first-order reductive dechlorination process; and solute transport of chlorinated ethanes with two different degradation pathways, including reductive dichlorination or an abiotic process. The tool was developed under the DoD

ESTCP, as part of Project Number ER-201730. *For more information and to download the tool, see* https://www.serdp-estcp.org/projects/details/bd9c56ae-002e-40fc-88cf-4a9c8566de93/er-201730-project-overview

ADAPTIVE SITE MANAGEMENT – A FRAMEWORK FOR IMPLEMENTING ADAPTIVE MANAGEMENT AT CONTAMINATED SEDIMENT SUPERFUND SITES

EPA Office of Research and Development, Sediment Assessment and Monitoring Sheet (SAMS), 19 pp. 2022

EPA prepared this fact sheet, part of the SAMS series, to describe how adaptive site management (ASM) can be applied to large, complex contaminated sediment sites in a manner consistent with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan. ASM is one option for planning remediation at large, complex Superfund sediment sites with long remediation times and high levels of uncertainty regarding the remedial actions necessary to achieve final, protective remediation goals. ASM relies on a plan developed in consultation with stakeholders to describe how Superfund processes will be assembled and utilized. The ASM plan includes the elements of site-specific goals, actions, monitoring, evaluation, and remedy adaptation and presents them within the Superfund context. Planning early in the remedial process ensures that these elements are agreed upon and available to guide decision-making throughout site cleanup. https://semspub.epa.gov/work/HQ/100003040.pdf

DEVELOPING FIELD-SCALE, GENTLE REMEDIATION OPTIONS FOR NUCLEAR SITES CONTAMINATED WITH 137CS AND 90SR: THE ROLE OF NATURE-BASED SOLUTIONS

Purkis, J.M., R.P. Bardos, J. Graham, and A.B. Cund.
Journal of Environmental Management 308:114620(2022)

Recent developments in applying gentle remediation options at the field-scale to remediate ^{90}Sr and ^{137}Cs, their risk management efficiency, directions for future application and research, and barriers to their further implementation at scale are assessed in this article. Wider benefits, such as biodiversity enhancements and how water filtration can be maximized at the field scale by intelligent application of these approaches are also discussed.

SUPERCRITICAL FLUID REMEDIATION FOR SOIL CONTAMINANTS: MECHANISMS, PARAMETER OPTIMIZATION AND PILOT SYSTEMS

Chen, L., J. Hasanov, J. Chen, Y. Feng, Y. Kanda, and A. Komiya.
The Journal of Supercritical Fluids 189:105718(2022)

This article summarizes and compares mechanisms and procedures of supercritical remediation technology for different contaminants. Characteristics of soil contaminants in representative "matrix" conditions and their related effects on the remediation process with supercritical fluid technology were analyzed. Operation conditions, flow design, processing time, and the entrainer applications in supercritical fluid remediation systems act more as coupled parameter groups rather than as single-parameter controlled systems. A summary of existing remediation prototypes showed a remediation efficiency of ~80%.

A COMPUTATIONAL FRAMEWORK FOR DESIGN AND OPTIMIZATION OF RISK-BASED SOIL AND GROUNDWATER REMEDIATION STRATEGIES

Wang, X., R. Li, Y. Tian, B. Zhang, Y. Zhao, T. Zhang, and C. Liu.
Processes 10(12):2572(2022)

A framework is proposed to consider the combined effects of active remediation strategies and natural attenuation potentials in the design and search for optimal remediation strategies. The framework integrates machine-learning and process-based models to expedite the optimization process with its applicability demonstrated at an As-contaminated field site. The process-based model was employed in the framework to simulate As concentration evolution by integrating geochemical and biogeochemical processes in soil and groundwater systems under various remediation scenarios. The simulation results of As concentration evolution, remedial activities, and associated remediation costs were used to train a machine learning model and apply random forest regression to establish a relationship between the remediation inputs, outcomes, and associated costs. The relationship was then used to search for optimal (low-cost) remedial strategies that met remediation constraints. The framework provides an effective way to search for optimal remediation strategies at other remediation sites. *This article is* ***Open Access*** *at*https://www.mdpi.com/2227-9717/10/12/2572.

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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