Technology Innovation News Survey

Entries for September 1-15, 2021

Market/Commercialization Information

DOE EM SPECIAL NOTICE - PROCUREMENT SCHEDULE UPDATE
Dept of Energy, Office of Environmental Management Business Center, Cincinnati, OH.
Contract Opportunities at SAM.gov, Solicitation EM_PROCUREMENT_UPDATE, 2021

The U.S. Department of Energy is providing updated procurement schedule information regarding near-term Final RFPs for future procurements under NAICS code 562910. Following are updated current projections for all major DOE-EM Final RFP releases for planning purposes for the next six months. The 6-month projection will be updated quarterly during the COVID-19 period and is subject to further change based on continued COVID-19 impacts. Final RFP release dates for major acquisitions for the 6-month period through February 2022 will occur no sooner than the following timeframes: (1) Hanford Integrated Tank Disposition Contract - October 2021; (2) Savannah River Site Management and Operating Contract - October 2021; (3) Depleted Uranium Hexafluoride Operations and Site Mission Support - January 2022; and (4) Portsmouth Decontamination and Decommissioning - January 2022.
https://beta.sam.gov/opp/2b5798c9269e4e33847c13753da5495e/view

ENVIRONMENTAL CONSOLIDATED SERVICES, W9124P-21-RFI-ECS2022
U.S. Army Contracting Command-Redstone Arsenal, AL.
Contract Opportunities at SAM.gov, Solicitation W9124P-RFI-ECS2022, 2021

This RFI is issued solely for information and planning purposes. The U.S. Army Contracting Command-Redstone, Base Operations Division CCAM-CAD-A, is conducting market research to help identify potential sources that can provide Environmental Consolidated Services for the U.S. Army Garrison - Redstone Department of Public Works, servicing all of Redstone Arsenal. This effort will encompass environmental support services, including specialized technical and administrative services in the areas of environmental restoration, biological and natural resources science, database management, geographic information systems and hazardous waste management at Redstone Arsenal, Alabama. This RFI will utilize NAICS code 541620. Period of performance is one base year and four option years (July 2, 2022 - July 1, 2027). Interested parties are requested to respond to this RFI with a white paper, 3 pages max, by 2:00 PM CT on October 25, 2021. https://sam.gov/opp/aadb264f09bb484694d51f174f656bea1/view

IMPLEMENTATION OF THE PWSS AND UIC PROGRAMS
Environmental Protection Agency, Cincinnati Acquisition Div., Cincinnati, OH.
Contract Opportunities at SAM.gov, Solicitation 68HERC22R0007, 2021

U.S. EPA is performing market research for large and small businesses in preparation for a future procurement for technical support for implementation of the Public Water System Supervision (PWSS) and Underground Injection Control (UIC) programs, which support the Safe Drinking Water Act (SDWA). EPA requires contract support to assist its efforts in developing and implementing regulations, conducting oversight, and carrying out other SDWA implementation activities. An IDIQ contract with both firm-fixed-price (FFP) and cost-plus-fixed-fee (CPFF) task orders is anticipated with an ordering period of 5 years, total LOE of about 800,000 hours. The applicable NAICS code is 541620, size standard $16.5M. To respond to this notice, submit capabilities statements through the FedConnect message center by 5:00 PM ET on October 28, 2021, 2020. https://sam.gov/opp/427a9dea9782460a8e3c1af047963d2e/view

JUNEAU ALASKA SOIL REMEDIATION CLEAN-UP ACTION PLAN (COMBINE)
Department of Commerce, National Oceanic and Atmospheric Administration, Kansas City, MO.
Contract Opportunities at SAM.gov, Solicitation NF-FS7100-22-00101CAL, 2021

This is a total small business set-aside under NAICS code 541620. NOAA's National Marine Fisheries Service formerly occupied and operated the Auke Bay Marine Station located at 11305 Glacier Highway, Juneau, Alaska 99821. The northern portion of the former facility is now owned by the City and Bureau of Juneau, but NOAA retains the environmental liabilities associated with historical battery recycling on the property, referred to as the Glacier Highway Battery Dump Site. The purpose of this project is to develop a cleanup action plan and cost estimate for remediating the site to a level that would support a "cleanup complete" determination by the Alaska Department of Environmental Conservation following implementation of the cleanup action plan and submission of the cleanup action report. Period of performance is 180 days from date of award. Offers are due by 11:59 PM ET on November 4, 2021.
https://beta.sam.gov/opp/cf9b3d6ec2564cf8acfa5e39afe5f094/view

CERCLA/RCRA/UST ENVIRONMENTAL STUDIES AND SERVICES
Naval Facilities Engineering Systems Command, NAVFAC Southwest, San Diego, CA.
Contract Opportunities at SAM.gov, Solicitation N6247321R3206, 2021

NAVFAC Southwest has issued this sources sought notice to invite responses to illuminate the potential for small business set-aside for this contract. Contractor shall provide a full range of A-E environmental engineering and scientific or technical management services necessary to implement the Navy's environmental restoration program and similar media requirements for other environmental programs. These efforts include studies; investigations; evaluations; consultations; conceptual design; value engineering; risk assessments; pilot or treatability projects to demonstrate innovative technologies; and operation, monitoring and optimization of environmental treatment or control systems. Contractor shall also provide engineering services related to either continuation of existing environmental restoration projects or implementation of new environmental restoration projects. Contract scope covers a 1-year base from date of award with options for four additional years or until the maximum quantity of $75M is reached. Statements of interest and capability are due by 1:00 PM ET on November 11, 2021. https://sam.gov/opp/009075f9c3bf4432a73b5384d0bf45f5/view

Cleanup News

NEW PERSPECTIVES ON HORIZONTAL WELLS FOR ASSESSMENT AND REMEDIATION
Wiley, W.F. I Colorado Environmental Management Society Webinar, virtual, 10 August, 73 minutes, 2021

This presentation details of horizontal well technology, including the key benefits, such as better performance than vertical wells and the ability to access otherwise inaccessible areas, and perspectives that can change when the entire plume can be properly addressed. Case studies are included that demonstrate key benefits and illustrate the ability to tackle plumes more efficiently and effectively.
https://www.gotostage.com/channel/32cea236cdfe49b2ade7fe267e5dfdfd/recording/8f6d692f1dce4c2eb403501b5861f753/watch?source=CHANNEL

IN SITU TREATMENT OF BTEX AND CVOC UNDER A LARGE CAR MANUFACTURING INDUSTRIAL PLANT
Carboni, M., G. Leonard, and K. Maerten.
RemTech Europe 2020: European Conference on Remediation Market and Technologies, 21-25 September, virtual, 20 minutes, 2020

Following a successful pilot-scale injection at a contaminated area beneath an active automobile manufacturing plant, a full-scale barrier injection of Plumestop® and Oxygen Release Compound to stimulate and maintain aerobic biodegradation of sorbed BTEX and consequential regeneration of the activated carbon barrier. The goal was to stop offsite migration of the plume. Implementation did not interrupt manufacturing operations. Reinjections were not needed due to the self-regenerating capability of the carbon through biodegradation, minimizing costs.
See ***times 0-20 minutes:*** https://www.youtube.com/watch?v=OZiITo18lcA&t=231s
Slides only: http://www.remtechexpo.com/images/speeches2020/Marcello-Carboni.pdf
See case study for more information: https://regenesis.com/wp-content/uploads/2019/02/2005_RFG_KrM51812_BTEX_CVOC_PStop_HRC_RDI_ORC_ROx_BF-1.pdf

REMEDIAL DESIGN WORK PLAN FOR RVAAP LOAD LINES 1, 2, 3, 4, AND 12 (RVAAP-08 TO 12): FORMER RAVENNA ARMY AMMUNITION PLANT PORTAGE AND TRUMBULL COUNTIES, OHIO
CH2M HILL Constructors, Inc. for U.S. Army Corps of Engineers Louisville District, 481 pp, 2020

This Remedial Design Work Plan presents the activities to implement ex situ thermal treatment of soil per the *Final Record of Decision Amendment for Soil, Sediment, and Surface Water at RVAAP Load Lines 1, 2, 3, 4, and 12*. The former RVAAP was a load, assemble, and pack facility built to produce large caliber artillery projectiles and bombs, and bulk explosives were loaded into munitions in the load lines. The approved remedy includes excavation of soil from 24 locations, ex situ thermal treatment of most of the excavated soil, offsite disposal of the remaining portion of the excavated soil (metals-contaminated), confirmation sampling, backfill and site restoration. Ex situ thermal treatment (enhanced thermal conduction) was selected for soil with PAH, explosives, or PCB contamination above industrial remedial goal options. Treatment verification samples will be collected from the thermally treated soil and analyzed for the applicable COCs (expedited turnaround will be requested for the laboratory analysis). Once the remedial goal options have been met, the treated soil will be used to backfill excavations. Ex situ thermal:
https://www.rvaap.org/docs/pub/E_RD_WP_LL1-4_12_40_00/E_RD_WP_LL1-4_12_40_00.pdf

GCW - CASE STUDY - BERLIN IN-SITU REMEDIATION OF A FORMER DRY-CLEANING-FACILITY WITH GROUNDWATER-CIRCULATION-WELL (IEG-GCW®) TECHNOLOGY
Bartsch, E. I Virtual Remediation Seminar, 19 May, 31 slides, 2021

This presentation includes results and lessons learned from the latest field implementations for remediation of contaminated sites using groundwater-circulation-well (IEG-GCW®) technology. A case study is presented, of remediation of a > 50,000 m^2 industrial site that has been contaminated by various industries over nearly two centuries. Thirty-three GCWs were installed and over 6 million cubic meters of groundwater recirculated. Flushing of the pore space occurs 5-20 times per year in a radius of up to 25 meters from the GCW. The GCWs are combined with vapor extraction units that have removed 12,000 kg of chlorinated hydrocarbons and BTEX.
Slides: https://www.remediationseminar.com/images/presentations/webinar/2021/210519_GCW_Remediation_Berlin.pdf
Register to see recording: https://register.gotowebinar.com/recording/2582786214082839041

GROUNDWATER REMEDIATION IN THE DENVER METRO - LESSONS LEARNED WORKING IN THE DENVER FORMATION
Studer, J.E. I Colorado Environmental Management Society Webinar, virtual, 9 March, 80 minutes, 2021

The Denver Formation forms the upper portion of the Denver Aquifer, which is subject to pollution from anthropogenic activities. Progress in treating groundwater contamination in the Denver Formation, especially using in-situ approaches, can be hampered by challenges presented by the formation-groundwater physical and biogeochemical characteristics and contaminant character. A case study is presented to demonstrate that challenges can be overcome with careful strategic planning, including detailed testing, remedial technology selection, and iterative approach. The phased full-scale remedial action against a PCE plume using an abiotic in-situ chemical reduction technology (BiRD) achieved a significant reduction of detected PCE concentrations to 360 ft downgradient of the source. All elective concentration-based cleanup levels were achieved between source area and principal performance well, downgradient ~180 ft. https://www.gotostage.com/channel/32cea236cdfe49b2ade7fe267e5dfdfd/recording/b7333fe79c6f428d93c8a6980932f1a2/watch?source=CHANNEL

Demonstrations / Feasibility Studies

EXPEDITED DNAPL DESTRUCTION VIA BIOSTIMULATION
Armstrong, K.C. I RemTech Europe 2020: European Conference on Remediation Market and Technologies, 21-25 September, virtual, 15 minutes, 2020

Releases of TCE at a former electronics manufacturer impacted shallow overburden-bedrock groundwater with DNAPL. Baseline TCE in bedrock ranged from 55-550 mg/L, up to ≈30% of TCE's aqueous solubility limit; *cis*-1,2-DCE was ≤15 mg/L, and VC was not detected above method detection limits. A pump and treat system managed plume migration though a low-impact, low-cost and sustainable strategy was desired to achieve enhanced reductive dechlorination (ERD) to target DNAPL destruction. A 3-year proof-of-concept (POC) study evaluated ERDenhanced™, a biostimulant formulated with a proprietary blend of micronutrients to determine the additives' ability to enhance native microbial populations, stimulate enhanced reductive dechlorination, and optimize syntropic relationships between dechlorinators and fermenters. Following successful treatment in the POC, a 20-month pilot study (PS) was performed to determine the transferability of POC study data and collect pre-design data for full-scale remedy. Two bedrock injection wells and a performance network of 8 bedrock wells were utilized. Performance data collected from monitoring wells within amended zones at the POC and PS locations indicated biostimulation with ERDenhanced provided robust and complete dechloration of TCE DNAPL and *cis*-1,2-DCE by optimizing the syntropy between dechlorinators and fermenters. Data demonstrated biostimulation with ERDenhanced expedited dechlorination rates, extended effect-residence times (8+ years) resulted in three orders-of-magnitude reductions in cVOC contaminant mass. *See* ***times 40-56:***
https://www.youtube.com/watch?v=OZiITo18lcA&t=231s

RARE-EARTH ELEMENTS AS NATURAL TRACERS FOR IN SITU REMEDIATION OF GROUNDWATER
Wilkin, R.T., T.R. Lee, R.D. Ludwig, C. Wadler, W. Brandon, B. Mueller, E. Davis, D. Luce, and T. Edwards. I Environmental Science & Technology 55(2):1251-1259(2021)

The use of rare-earth elements (REE) as natural geochemical tracers to analyze groundwater remediation was examined in several permeable reactive barriers (PRBs) composed of e zero-valent iron (ZVI) and organic-carbon plus limestone mixtures to treat groundwater contamination. ZVI removed REEs from groundwater to below detection levels. Subsequent rebound of REE concentrations down-gradient of the treatment zones was not observed. REE concentrations within and down-gradient of an organic-carbon/limestone PRB were significantly reduced compared to levels in the influent groundwater. The field data indicated increased solid-phase partitioning of REEs occurred with increasing pH, and heavy REEs were preferentially removed compared to light REEs in ZVI systems.

PFAS PHASE I PILOT-SCALE TREATMENT STUDY FINAL REPORT
Pannu, M. and M. Plumlee for the Orange County Water District, 41 pp, 2021

A pilot-scale treatment study was conducted to test different types of adsorbent media, including granulated activated carbon (GAC), ion exchange (IX) resins, and alternative adsorbents to remove PFAS from affected wells within the Orange County Groundwater Basin. Fourteen different media were evaluated via pilot testing for 13 months using empty bed contact times (EBCTs) (10 min for GAC, 2 min for IX, and 2 to 5 min for alternative adsorbents). All products initially demonstrated removal of PFOA to below detection limit (2 ng/L); media performance was then compared based on time to reach initial breakthrough (>2 ng/L) and significant breakthrough (defined as 60% exhaustion when effluent concentration is ~60% of influent concentration). Breakthrough occurred slower for PFOS than PFOA for all IX and alternative adsorbents that showed no PFOS breakthrough after 13 months (for IX) and 11 months (for alternative adsorbents). PFOS breakthrough was also slower than PFOA for GAC but faster compared to the other media. For short-chain PFAS, PFBS removal was sustained longest by IX, followed by alternative adsorbents and GAC with the shortest breakthrough time.
https://www.ocwd.com/media/9829/2021-03-24_ocwd-pfas-pilot-i_finalreport.pdf

A NEW METHOD FOR DETERMINING COMPOUND SPECIFIC CARBON ISOTOPE OF CHLORINATED SOLVENTS IN POREWATER
Herrero, J., D. Puigserver, B.L. Parker, and J.M. Carmona.
Groundwater Monitoring & Remediation 41(3):51-57(2021)

This study presents a new method to extract chloroethenes and chloromethanes from porewater using dimethylacetamide (DMA) as a solvent and determine δ13C by gas chromatography isotope ratio mass spectrometry with solid-phase microextraction. Extraction led to a minimal loss of mass of solvent and chlorinated compounds. The accuracy of the method was verified by analyzing pure injected compounds using isotope ratio mass spectrometry. It was effectively applied in a study area in saturated soil samples within a source zone contaminated with PCE and TCE. The new method's quantification limit was 0.034 µg/g for PCE and TCE for 10-20 g of soil sample. This method allows for compound-specific isotope analysis of chlorinated solvents in porewater.

VERTICAL HYDRAULIC GRADIENT ESTIMATION IN CLAY TILL, USING MIHPT ADVANCED DIRECT-PUSH TECHNOLOGY
Rosenberg, L., M.M. Broholm, N. Tuxen, I.H. Kerrn-Jespersen, G. Lilaek, and P.L. Bjerg.
Groundwater Monitoring & Remediation [Published online 24 June 2021 prior to print]

This study focuses on advancing the combined membrane interface probe hydraulic profiling tool (MiHPT) to investigate the vertical hydraulic gradient across a clay till overlying a sandy aquifer at a contaminated site in Denmark. MiHPT measurements of the hydraulic head, clay till thickness, and resulting vertical hydraulic gradients compared well with observations from nearby nested wells. The parameter with the largest discrepancy was the thickness of the clay till. The advantage of the MiHPT is its relatively quick depth discrete access to information regarding subsurface permeability, vertical hydraulic gradients, and contaminant distribution across a site. In this case study, the performance of additional dissipation tests during the HPT log to acquire determination of the vertical hydraulic gradient increased the cost by 3% compared to standard HPT logs.

Research

NATURAL FUNGAL ENDOPHYTES FROM NOCCAEA CAERULESCENS MEDIATE NEUTRAL TO POSITIVE EFFECTS ON PLANT BIOMASS, MINERAL NUTRITION AND ZN PHYTOEXTRACTION
Yung, L., C. Sirguey, A. Azou-Barre, and D. Blaudez.
Frontiers in Microbiology 12:689367(2021)

Fungal endophytes were isolated from calamine or non-metalliferous populations of the Cd/Zn hyperaccumulator *Noccaea caerulescens* and tested for their growth promotion abilities affecting the host plant. Plants were inoculated with 7 different isolates and grown for 2 months in trace element-contaminated soil. The outcomes of the interactions between *N. caerulescens* and its native strains ranged from neutral to beneficial. *Alternaria thlaspis* (non-metallicolous population) and *Metapochonia rubescens* (calamine population) exhibited the most promising abilities to enhance the Zn phytoextraction potential of *N. caerulescens* related to a significant increase of the plant biomass. These strains significantly increased the root elemental composition, particularly in the case of K, P, and S, suggesting an improvement in plant nutrition. https://www.frontiersin.org/articles/10.3389/fmicb.2021.689367/full

ROLE OF TEMPO IN ENHANCING PERMANGANATE OXIDATION TOWARD ORGANIC CONTAMINANTS
Zhang, H., Z. Shi, R. Bai, D. Wang, F. Cui, J. Zhang, and T.J. Strathmann.
Environmental Science & Technology 55(11::7681-7689(2021)

In this study, 2,2,6,6-tetramethylpiperidine-N-oxyl (TEMPO) as an electron shuttle enhanced permanganate (Mn(VII)) oxidation toward various trace organic contaminants (TrOCs), including bisphenol A (BPA), phenol, estrone, and sulfisoxazole. TEMPO sped up the oxidative kinetics of BPA by Mn(VII) and was observed at a wide pH range of 4.0–11.0. The exact mechanism of TEMPO in Mn(VII) oxidation was described as follows: (i) TEMPO was oxidized by Mn(VII) to its oxoammonium cation (TEMPO+) by electron transfer, which was the reactive species responsible for the accelerated degradation of TrOCs and (ii) $TEMPO^+$ could decompose TrOCs rapidly with itself back to TEMPO or TEMPOH (TEMPO hydroxylamine). The transformation pathways of BPA in Mn(VII)/TEMPO oxidation were explored to further illustrate the interaction between TEMPO and target TrOCs. Compared to Mn(VII) alone, adding TEMPO into the Mn(VII) solution significantly suppressed BPA's self-coupling and promoted hydroxylation, ring-opening, and decarboxylation.

EXPLORING THE UTILITY OF COMPOUND-SPECIFIC ISOTOPE ANALYSIS FOR ASSESSING FERROUS IRON-MEDIATED REDUCTION OF RDX IN THE SUBSURFACE
Tong, Y., M.J. Berens, B.A. Ulrich, J. Bolotin, J.H. Strehlau, T.B. Hofstetter, and W.A. Arnold.
Environmental Science & Technology 55(10):6752-6763(2021)

N and C isotope fractionation of hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) was evaluated during Fe(II) reduction associated with Fe minerals and natural sediments. In addition, N isotope ratios were applied to assess mineral-catalyzed RDX reduction in a contaminant plume and sediment columns treated by in situ chemical reduction. Lab studies revealed that RDX was reduced to nitroso compounds without denitration and the concomitant ring cleavage. Fe(II)/iron oxide mineral-catalyzed reactions exhibited N isotope enrichment factors, εN, between ¯3±0.3‰ and ¯8.2±0.2‰, corresponding to an apparent 15N kinetic isotope effect of 1.04–1.05. The observed variations of the δ15N of ~15‰ in RDX from groundwater samples suggested a reductive transformation of 85%. Conversely, masking of N isotope fractionation after RDX reduction in laboratory flow-through systems was observed, presumably due to limited accessibility to reactive Fe(II).

COST ANALYSIS OF THE IMPACTS ON MUNICIPAL UTILITIES AND BIOSOLIDS MANAGEMENT TO ADDRESS PFAS CONTAMINATION
CDM Smith, North East Biosolids & Residuals Association (NEBRA), Water Environment Federation (WEF) and the National Association of Clean Water Agencies (NACWA), 81 pp, 2020

A cost analysis of the impacts of PFAS policies and regulations on municipal utilities and biosolids management entities was conducted. The end goal was to produce informative materials to share with federal, state, and local legislators, regulators, government officials, and the broader public to inform PFAS policy decisions and identify unintended consequences.
https://www.wef.org/globalassets/assets-wef/3---resources/topics/a-n/biosolids/technical-resources/cost-analysis-of-pfas-on-biosolids---final.pdf

UTILIZING THE PLANT MICROBIOME AND BIOAUGMENTATION TO DEGRADE 1,4-DIOXANE AND CO-CONTAMINANTS
Schnoor, J.L. SERDP Project ER-2719, 65 pp, 2021

This project evaluated bioaugmented phytoremediation, a promising, cost-effective cleanup strategy for dioxane-contaminated groundwater. The objective was to discover microbial strains that can degrade 1,4-dioxane to health advisory levels. In addition, the performance of candidate organisms when bioaugmented into the poplar rhizosphere was evaluated. https://www.serdp-estcp.org/content/download/53798/528493/file/ER-2719%20Final%20Report.pdf

QUALITY ASSURANCE AND QUALITY CONTROL OF SOLID PHASE EXTRACTION FOR PFAS IN WATER AND NOVEL ANALYTICAL TECHNIQUES FOR PFAS ANALYSIS
Taniyasu, S., L.W.Y. Yeung, H. Lin, E. Yamazaki, H. Eun, P.K.S. Lam, and N. Yamashita.
Chemosphere 288 (Part 1):132440(2022)

An inter-lab trial (ILT) was performed to validate the ISO 21675 method to measure PFAS in water samples using solid phase extraction and high-performance liquid chromatography-tandem mass spectrometry. Twenty-seven laboratories from eleven countries participated in the ILT. Results of the homogeneity of ILT water samples showed that the repeatability tended to increase from short to long-chain PFAS. Stability results of PFAS in Milli-Q water stored at 5 ± 3°C ranged from 75% to 121%, including ultra-short-chain compounds, except for N-MeFOSA (44%), N-EtFOSA (44%), and 8:2 FTOH (30%) at 168 days. The stability of PFAS in environmental waters were within an acceptable range (70 and 125%) for most PFAS, except for 8:2 FTUCA in river water, seawater, and wastewater, and 8:2 FTSA and 8:2 FTOH in wastewater. Based on the performance data (reproducibility (CVR):

QUANTIFICATION OF IN SITU CHEMICAL REDUCTIVE DEFLUORINATION (ISCRD) OF PERFLUOROALKYL ACIDS IN GROUNDWATER IMPACTED BY AFFFS
Lee, L., L. Nies, and V. Medina. SERDP Project ER-2426, 93 pp, 2021

This study investigated a subset of zero-valent metals/bimetal particles alone and associated with a carrier for ease of injection (e.g., synthesized within clay interlayers or onto granulated activated carbon) and a metal-catalyzed Vitamin B12 to defluorinate PFAS (primarily PFOS) and a coupled reductive/oxidative (permanganate/persulfate) technology. To different extents depending on the success of preliminary experiments, the studies included: (1) quantifying the magnitude, rate, and effectiveness of a technique to defluorinate linear PFOS in aqueous batch reactions within environmentally relevant PFOS concentration ranges with multiple lines of evidence (PFOS loss, generation of inorganic (fluoride and sulfite) and organic products; (2) characterizing intermediates resulting from incomplete defluorination; and (3) quantifying matrix effects; and (4) evaluating defluorination in column studies.
https://www.serdp-estcp.org/content/download/53793/528447/file/ER-2426%20Final%20Report.pdf

ANALYTICAL MODEL FOR VOLATILE ORGANIC COMPOUND TRANSPORT IN THE COUPLED VADOSE ZONE-GROUNDWATER SYSTEM
Huang, J. l Journal of Hydrologic Engineering 26(1):1-14(2021)

This study proposes the use of a 3D mathematical model to describe VOC transport in a coupled vadose-saturated zone system. Advection, dispersion, interphase mass transfer, and diffusive mass exchange between two horizontal porous media formations, and the time-dependent mass loading from a source zone, were incorporated into the model. The analytical solutions were derived subject to specific initial and boundary conditions; solutions were evaluated by numerical Laplace inverse transform. The model solutions can be used to study the fate and transport in subsurface formations composed of a vadose zone and a water table aquifer, where the VOC is released from entrapped nonaqueous phase liquid in the vadose zone, or the dissolved VOC transports with groundwater accompanied by diffusive mass transfer into the overlying soil formations. Mass transfer between two layers is demonstrated to have back-diffusion characteristics, resulting in secondary contamination and retains low levels of contaminant concentrations over time.

General News

PFAS DATA MANAGEMENT REQUIRES DIFFERENT STRATEGIES - CONSIDERATIONS FOR AN EFFICIENT AND EFFECTIVE PROGRAM
Turner, C. l American Institute of Professional Geologists Michigan Section Workshop, 15-17 June, virtual, 46 minutes, 2021

This workshop discusses different strategies for data handling and management practices required for PFAS. Key reasons that PFAS data require a different data management strategy and questions to consider include: (1) What compounds are considered PFAS chemicals? What in the sampling and data reports really matter, and how should they be organized? (2) Analytical methods are still under development. What data management practices can be employed to ensure comparability between datasets using different methods? (3) Regulatory criteria are not uniform and are changing. In the absence of federal regulatory requirements, states have been developing their own numeric cleanup criteria. These vary from state to state, reflecting the knowledge limits regarding human health and ecological risks. Standards are trending lower and approaching current analytical reporting limits. This points to a need to carefully consider the use of data qualifiers so that data comparisons to standards are characterized appropriately. 4. (4) Effective treatments to remediate PFAS are still being researched. What ancillary information is needed to facilitate decisions regarding remediation of PFAS as new technologies come online? (5) The ability to distinguish PFAS sources based on the chemical signature is an area under development. A successful data management program needs to achieve a balance between needing to backfill data later and investing too much time up front to store unnecessary information. https://www.youtube.com/watch?v=cjqpxZzvTtU

GUIDANCE FOR USING COMPOUND SPECIFIC ISOTOPE ANALYSIS (CSIA) FOR THE ASSESSMENT OF TRANSFORMATION OF NITROAROMATIC EXPLOSIVES AND RDX
Arnold, W.A., T.B. Hofstetter, and N.C. Sturchio. SERDP Project ER-2618, 57 pp, 2021

Methods are needed to verify that attenuation of groundwater contaminated with energetic compounds, such as trinitrotoluene (TNT) and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), is occurring and verify that strategies to enhance degradation processes have the desired effects. This document provides a primer on sample collection, processing, and laboratory CSIA methods for nitro explosives. Data evaluation, analysis, and interpretation for single and dual-isotope fractionation are presented. Two case studies are used to demonstrate the procedures for using CSIA to support the identification of the relevant reaction process and calculate the extent of which reaction, versus dilution or sorption, leads to decreasing concentrations. https://www.serdp-estcp.org/content/download/53854/529027/file/ER-2618%20Guidance%20Document.pdf

A PRACTITIONERS GUIDE TO THE EVOLUTION OF HIGH RESOLUTION SITE CHARACTERIZATION
Dyment, S. l EPA Presentation to Taiwan EPA through the Office of International and Tribal Affairs and in cooperation with OSRT, 30 October, 21 slides, 2020

This module provides an overview of the evolution of the Triad approach and history of EPA's Superfund optimization program, which led to the expansion in the use of high-resolution tools and strategies.
https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=541898&lab=CESER

VAPOR INTRUSION - REVIEW OF THE EVOLUTION OF VI ASSESSMENT AND EXPECTED FUTURE TREND
Chilcote, L. l REMEDy for Contaminated Sites, 30 September, virtual, 21 minutes, 2020

This presentation reviews the evolution of the vapor intrusion assessment process, how it has changed over the last 20 years, and where it is headed in the future. The current state of the art, how data drives research, and why some data may have misinformed researchers is discussed. The presentation also discusses renewed efforts to assess the importance of preferential pathways such as sanitary sewers and the development of indicators, tracers, and surrogates to predict when to collect the most representative sample. A case study on a major project in the U.S. that evolved from a classical look at vapor intrusion from groundwater contamination to one dominated by the influence of preferential pathways is presented. https://www.youtube.com/watch?v=WX6vXpSd1Dw&t=1s

ANALYSIS OF THE LONG-TERM EFFECTIVENESS OF BIOCHAR IMMOBILIZATION REMEDIATION ON HEAVY METAL CONTAMINATED SOIL AND THE POTENTIAL ENVIRONMENTAL FACTORS WEAKENING THE REMEDIATION EFFECT: A REVIEW
Wang, J., L. Shi, L. Zhai, H. Zhang, S. Wang, J. Zou, Z. Shen, C. Lian, and Y. Chen.
Ecotoxicology and Environmental Safety 207:111261(2021)

Published literature results on the remediation effects of biochar for heavy metal-contaminated soil, its application in field remediation, and potential abiotic and biotic factors that may weaken the immobilization effects of biochar are reviewed in this article. Results indicate that (1) Biochar is widely used to remediate heavy metal-contaminated soil in different areas and has an excellent immobilization effect; (2) Most research demonstrates that the immobilization effect of biochar is effective for 2–3 years or up to 5 years, but the immobilization effect may decrease over time; (3) Abiotic factors such as acid rain, flooded environment, and changes in soil condition and biochar can significantly weaken the immobilization effect of biochar; and (4) Biotic factors such as plant roots, earthworms, and soil microorganisms can also significantly reduce the immobilization effect.
https://reader.elsevier.com/reader/sd/pii/S0147651320310099X?token=DFEFF728531A7DE40E584EAE30EA2DCE566B1C9967AB90EB11B3BC5B854ABD85D056CD91DCDA93217D63C5AA96CA6ACD&originRegion=us-east-1&originCreation=20210826

DEVELOPMENT OF A DECISION SUPPORT TOOL FOR VADOSE ZONE REMEDIATION OF VOLATILE CONTAMINANTS
Popovic, J., D.J. Becker, C.M. Harms, C.D. Johnson, K.A. Muller, M.J. Truex, and G. Tartakovsky, ESTCP Project ER-201731, 123 pp, 2021

The soil vapor extraction Endstate Tool version 2 (SVEET2) is an updated version of the SVEET spreadsheet software used to estimate contaminant concentrations in groundwater and soil gas caused by a vadose zone contaminant source. SVEET2 has a rigorous basis from numerical model simulations for a generalized conceptual model that covers a set of parameters and contaminants relevant to a wider variety of sites than SVEET version 1.0. The software update includes results from over 5,500 numerical simulations to provide expanded options for site applicability. https://www.serdp-estcp.org/content/download/53799/528503/file/ER-201731%20Final%20Report.pdf

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