Technology Innovation News Survey

Entries for April 1-15, 2022

Market/Commercialization Information

INDEFINITE DELIVERY ARCHITECT-ENGINEER CONTRACT FOR HAZARDOUS, TOXIC AND RADIOACTIVE (HTRW) SERVICES, PRIMARILY VARIOUS LOCATIONS, ALASKA

U.S. Army Corps of Engineers(USACE), Alaska District, Anchorage, AK
Contract Opportunities at SAM.gov, Solicitation W911KB22R0007, 2022

This is a partial small business set-aside under NAICS code 541330. USACE's Alaska District requires an Architectural and Engineering firm with sufficient staff, flexibility, and capability to be available on an as-needed basis to support USACE's Hazardous, Toxic, and Radioactive Investigation Waste (HTRW) program, including planning and design for cleanup of HTRW, debris, and other environmental contaminants at various locations in Alaska and other Pacific Ocean Division Areas of Responsibility. The selected firm must have the skills for and may perform any or all of the following tasks: technical expertise in all phases of environmental and HTRW management; environmental sampling; resource and regulatory agency coordination; RCRA/CERCLA/SARA/TSCA/ADEC compliance as appropriate for specific sites or projects; community relations; developing conceptual site models; performing preliminary assessments; site inspections; remedial investigation/feasibility studies; geophysical investigations, debris inventory, and drum characterization; establishment of Data Quality Objectives; developing and implementing sampling analysis, QA/QC or UFP/QAPP, and health and safety plans; validation of chemical data and development of chemical quality assurance reports, reviewing and interpreting analytical chemical data, and developing alternative cleanup levels; performing human health and ecological screening/risk assessments; researching the most appropriate, cost effective remedial actions; preparing remedial action plans; preparing cost estimates; performing underground storage tank assessment work; and completing other tasks related to the investigation and characterization of HTRW and other environmental contaminants (including asbestos, lead-based paint, air emissions, storm water pollution and prevention plans, munitions and explosives of concern, etc.). Offers are due by 2:00 PM AKDT on June 6, 2022.https://sam.gov/opp/11baeb3de07a415a37103c92e5c23d6/view

USPS IQ AE ENVIRONMENTAL - AREA 3

U.S. Postal Service, Supplies Material Management, Philadelphia, PA
Contract Opportunities at SAM.gov, Solicitation 104267-22-A-0008, 2022

This is a full and open competition under NAICS code 541620. The U.S. Postal service requires a contractor with experience in the following areas: surveys, monitoring, mitigation plans and remediation oversight for materials including asbestos-containing materials, lead-based paint (with XRF capability), radon, mold, lead in drinking water and indoor air quality reporting; underground and aboveground storage tank services including but not limited to closure plans, design packages, tightness testing, cathodic protection, stage II vapor recovery and monitoring system checks; human health protection and communication regarding asbestos- containing materials, lead-based paint and underground storage tank projects; preparation of Health and Safety Plans; health and safety related training; and risk assessment and communication; site remediation services provided by state-certified staff; site evaluations for property transactions including Phase I Environmental Site Assessments, Phase II Site Investigations, Site Disposal Due Diligence, Environmental Assessments and Programmatic Environmental Assessments as per NEPA; emergency response actions and remedial services and hazardous materials management; permitting matters as required by various regulatory programs including but not limited to air quality (stationary and mobile source), water quality, storm-water management and wetlands; and plan preparation in compliance with various federal and state requirements including but not limited to: Storm Water Pollution Prevention Plans, Spill Prevention Control and Countermeasures Plans, Tank Management Plans and Asbestos and Lead Operations and Management Plans. The award will be an indefinite delivery-indefinite quantity contract with a two-year base year and four two-year renewal options. The work order limit is not to exceed $5 million with a contract total not to exceed $10 million. Offers are due by 3:00 PM EDT on June 14, 2022. https://sam.gov/opp/72e24de2367e47aeaf852f1d4d1ec5cb/view

PCE SOUTHEAST OU1 & OU2 REMEDIAL ACTION - IN-SITU THERMAL REMEDIATION (ISTR)

U.S. Environmental Protection Agency, Region 7 Contracting Office, Lenexa, KS
Contract Opportunities at SAM.gov, Solicitation 68HE0722R0030, 2022

When the solicitation is released on or around June 1, 2022, it will be competed as a women-owned small business set-aside under NAICS code 562910. EPA Region 7 is seeking the services of an experienced firm to provide in-situ thermal remedial action for PCE- and TCE-contaminated soils within Operable Unit (OU) 1 and OU2 in downtown York, Nebraska. OU1 will be implemented almost entirely under the existing former dry cleaner building (a portion of the building is used for business storage and the other half consist of vacant storefronts), and OU2 will include implementing thermal beneath a portion of the former dry cleaner building (currently used as a restaurant) with the majority of the source located under the street. EPA anticipates this work to be done under an Indefinite Delivery Indefinite Quantity contract with fixed-unit prices contract consisting of a three-year base period. The estimated dollar value for this procurement is between $8 and $12 million. https://sam.gov/opp/4b72d0a6f9634316be8a7b11ddf3329e/view

DFSP POINT LOMA ENVIRONMENTAL RESTORATION, COMPLIANCE, AND FACILITY MANAGEMENT SERVICES

U.S. Department of Defense Logistics Agency, Energy Command, Fort Belvoir, VA
Contract Opportunities at SAM.gov, Solicitation SPE603-22-R-0509, 2022

When the solicitation is released on or around May 18, it will be competed as a total small business set-aside under NAICS code 562910. The U.S. Department of Defense Logistics Agency, Energy Command, requires environmental compliance, environmental restoration, and environmental facility maintenance services at Defense Fuel Support Point, Point Loma, CA to include operation and maintenance of existing remedial systems, facility groundwater monitoring and reporting, data management services and professional services (project management and technical support). The period of performance of this anticipated contract is four years with a six-month extension provision. The Government anticipates awarding one firm fixed-price contract. This is not a Request for Proposal or a promise by the Government to pay for information received in response to this synopsis or any subsequent announcement.
https://sam.gov/opp/26473f227f3e4a4b9bfcbec7f875a8e9/view

Cleanup News

ABIOTIC, BIOTIC OR BOTH FOR ENHANCED REDUCTIVE DECHLORINATION

Elkins, B. I REMEDy 2021, 29 September, virtual, 15 minutes, 2021

This presentation explores the strengths and weaknesses of enhanced in situ bioremediation (EISB) and in situ chemical reduction (ISCR) and covers example site conditions and limitations that must be overcome for either technology to succeed. It concludes with a case study from a California dry cleaner where both EISB and ISCR were deployed in tandem resulting in a PCE decrease of several orders of magnitude. https://www.youtube.com/watch?v=-eAg4jY5gx4

GROUNDWATER PUMP AND TREAT SYSTEM OPTIMIZATION REPORT U.S. DOE NNSA PANTEX PLANT, TEXAS

HydroGeoLogic, Inc for Consolidated Nuclear Security, LLC, 153 pp, 2021

Two perched groundwater pump and treat (P&T) systems (PTS) were optimized at the Pantex Plant based on recommendations from the second Five-Year Review and objectives specified in the Record of Decision. Optimization included updating the perched groundwater conceptual site model (CSM) and associated single-layer model (SLM) using the most recent data available, optimizing existing and additional infrastructure design and operation to remediate the Southeast Off-Site Plume Area, and optimizing operation of the existing on-site groundwater P&T system. The updated CSM and SLM provided the foundation to optimize the P&T systems. Six scenarios were evaluated using the SLM to optimize P&T system performance. The response of hexahydro-1,3,5- trinitro-1,3,5-triazine (RDX), Cr(VI), and perchlorate to different P&T system configurations was used to evaluate the scenarios and develop recommendations for system optimization. Recommendations were: 1) evaluate the fate/transport of RDX near Playa 1, including transport/mass flux through the vadose zone to the underlying Ogallala Aquifer and transport within the Ogallala Aquifer before shutting downs the Playa 1 PTS; 2) add one new well northwest of Playa 1 to maximize pumping from the existing P1PTS wells with the highest mass removal if Playa I remains operational; 3) install additional extraction wells east of FM 2373 to remove 212.9 kg of RDX from areas near the perched extent of the southern boundary of the facility; 4) add three extraction wells south of Zone 12 and west of the SEPTS to remove 99.6 kg of perchlorate; 5) utilize the per-well results to identify/prioritize individual P&T system extraction wells and pumping rates to maximize mass and water removal efficiency; and 6) install additional extraction wells to provide additional mass removal. https://www.osti.gov/servlets/purl/1834053
All site documents: https://pantex.energy.gov/mission/environment/environmental-cleanup-documents-0

TREATING 1,4-DIOXANE WITH ACTIVATED POTASSIUM PERSULFATE

Hicks, P. I 29th Annual David S. Snipes/Clemson Hydrogeology Symposium, 21 October, Clemson, SC, 24 minutes, 2021

Alkaline activated potassium persulfate was used to remediate 1,4-dioxane, chlorinated ethenes, and chlorinated ethanes at two sites to evaluate the oxidative radical and the reductive treatment pathways. Site groundwater was processed through column reactors until potassium persulfate was consumed. A pilot test that applied a full-scale application of alkaline activated potassium persulfate at one of the sites was successful. Hydrated lime-induced alkaline-activated potassium persulfate reduced concentrations of 1,4-dioxane, chlorinated ethenes, and chlorinated ethanes to below the detection limit. Zero-valent iron-activated persulfate treated 1,4-dioxane to non-detect while reducing chlorinated ethanes by 20-60%. Field data were used to evaluate the persistence of potassium persulfate compared to the site's groundwater velocity. Results indicated the potassium persulfate persisted as expected based on the observed groundwater velocities and the 1,4-dioxane treatment that decreased concentrations at the permeable reactive barrier and significantly reduced down-gradient concentrations.
https://clemson.app.box.com/s/dmck2528clod6q7gevrxfiyg0qg5b6v1/file/906259790948

DPT JET INJECTION AS A PASSIVE, RAPID DEPLOYMENT, LONG-TERM EFFECTIVE REMEDIATION STRATEGY TO ADDRESS CVOCS IN LOW-PERMEABILITY ZONES

Martin, M., C. Shores, and J. Ahrens. I 29th Annual David S. Snipes/Clemson Hydrogeology Symposium, 21 October, Clemson, SC, 26 minutes, 2021

This case study presents results utilizing DirectPush Technology (DPT) Jet Injection (DPT-JI) to emplace microscale zero-valent iron (mZVI) and KB-1® Plus to remediate CVOCs in low-permeability zones. The objective was to perform time-critical, bulk reduction of the chlorinated solvent impacts (CVOCs >5,800 µg/L) in groundwater in a tight clay formation at a former dry cleaner site prior to construction and redevelopment. Limited excavation focused on the former dry cleaner footprint (~3,000 ft^2) and removed ~1,400 tons of impacted soil, primarily dense clay to ~10 ft bgs. To address the remaining dissolved CVOC plume, DPT-JI was utilized to target impacts to the surficial aquifer by emplacing ~183,000 lbs of mZVI into 34 DPT injection points to achieve an injection radius of influence of ~15 ft and a treatment area of ~20,000 ft^2, creating 3-5 fracture intervals at each injection point. A slurry of mZVI, sand, and guar gum (thickening agent) delivered the solid mZVI material and limited mZVI aggregation within the aquifer matrix. KB-1 Plus bioaugmentation culture was incorporated into the slurry at each injection point to enhance the breakdown of the guar gum and promote biodegradation. Data collected after injection indicated that the remedies achieved a >96% and 85% reduction in PCE and CVOC, respectively, compared to the pre-remedial investigations, with strong indicators that biotic and abiotic degradation pathways were occurring. The combined remedies significantly reduced PCE mass within the perched zone of the former dry cleaner footprint and in the surficial aquifer impacts downgradient of the source area. While target remedial objectives were met, mZVI durability of mZVI in the subsurface should further degrade remnant CVOCs. https://clemson.app.box.com/s/dmck2528clod6q7gevrxfiyg0qg5b6v1/file/906271094482

Demonstrations / Feasibility Studies

STABLE CARBON ISOTOPES FOR TRACING IN SITU RDX REMEDIATION

Boyd, T.J., R.H. Cuenca, Y. Hagimoto, M.M. Michalsen, C. Tobias, and J. Popovic. NAVFAC Report NRL/6180/MR--2021/1, 60 pp, 2021

A validation demonstration using ^{13}C-labeled RDX to determine in situ contaminant biodegradation rates was conducted at two sites at the Naval Base Kitsap-Bangor. Six push-pull tests (PPTs) were chosen at each site based on previous bio-augmentation (with known RDX-degrading bacteria) and biostimulation (fructose addition). PPTs were conducted with ~500 gals of natural groundwater containing Cl^- or Br^- conservative tracers to calculate dilution, ^{13}C -RDX, and biostimulant (fructose) at selected wells. Post-push subsamples were collected over ~one month and analyzed for RDX, RDX biodegradation daughter products (MNX, DNX, TNX), conservative tracers, and relevant C pools (CO_2, CH_4, $\delta^{13}CO_2$, $\delta^{13}CH_4$). Respiration ($\delta^{13}CO_2$ and CH_4), isotopic enrichment (calculated from $\delta^{13}CO_2$ and $\delta^{13}CH_4$), and RDX growth efficiency lab estimates were used to calculate the in situ RDX degradation rate. Calculated rates were similar (but lower) than rates calculated by traditional PPT RDX extinction models. Biomass recycling may be why ^{13}C enrichment in the CO_2 pool was observed for many months following PPT. Smaller-scale deployments using fewer materials and long-term CO_2 in-well trapping offer inexpensive options for using stable isotope technologies to definitively confirm biological contaminant degradation and estimate in situ degradation rates. https://apps.dtic.mil/sti/pdfs/AD1122062.pdf

REMEDIATION OF BENZENE AND 1,2-DICHLOROETHYLENE IN GROUNDWATER BY FUNNEL AND GATE PERMEABLE REACTIVE BARRIER (FGPRB): A CASE STUDY

Gao, C., Q. Song, X. Li, L. Wang, Y. Zhai, X. Du, and W. Yin. I Water 13:3336(2021)

A pilot test using a FGPRB was established downstream of a petrochemical site to clarify the impact on groundwater dynamic conditions. Results showed that groundwater concentrations of 1,2-DCE and benzene decreased to below the detection limit. Numerical simulation results indicated that both point source and area source pollution achieved a delay effect, extending the response time after establishing FGPRB from ~27 d to ~65 d. Changing the thickness and permeability coefficient had no obvious impact on the delay effect. A tracer test showed the average permeability coefficient of the medium from the injection well to the monitoring well decreased from 77.0 m/d to 31.2 m/d, and the average seepage velocity from the injection well to the monitoring well decreased from 0.19 m/d to 0.078 m/d. The max concentration time from the injection well to the monitoring well increased from ~10 d (before construction) to ~27 days (after construction). Results confirmed that the FGPRB changed the hydrodynamic conditions of groundwater and delayed the response time of pollutants in the monitoring well.
This article is Open Access at https://www.mdpi.com/2073-4441/13/23/3336

CASE STUDY OF LAND RECLAIM BY PHYTOREMEDIATION: FROM TPH CONTAMINATION TO POTENTIAL AGRICULTURAL VALUE

Barrere, A. S. Kaskassian, J. Estival, F. Le Chevalier, and H. Thouement
AquaConSoil 2021, 15-17 June, virtual, abstract only, 2021

Drilling of a former oil/gas extraction well resulted in 16,000 m^3 of diesel-contaminated soil (concentrations ~29,800 ± 9,960 mg/kg) stored onsite within a clay-capped area for 30 years. To restore the site to its previous agricultural use, the pilot test aimed to 1) design a nature-based remediation solution taking into account limited access and space on site; 2) develop a field pilot test to test different biodegradation and/or rhizodegradation solutions, monitor relevant media/parameters as a proof of concept, accounting for each remediation process (plant uptake, degradation by bacteria, fungi or induced by plants), and compute all metrics for upscaling the remediation works; and 3) demonstrate the potential reuse of reclaimed land through soil health, ecotoxicity, plant transfer, and biomass value. After ~30 months, the pilot achieved 85% TPH mass reduction in the vegetation-enhanced biopiles while increasing soil quality, growth, and diversity of fauna and biomass. TPH and metallic co-contaminant transfer to plants (stem, foliage, buds) was minimal and showed compatible levels for biomass various uses, from energy (biomethane) to fodder production or industrial uses (e.g. bio-sourced products). Compared to traditional biopile techniques, phytomanagement also reduced the carbon footprint and the economic cost of remediation solutions.

THE EFFECT OF HETEROGENEITY ON THE DISTRIBUTION AND TREATMENT OF PFAS IN A COMPLEX GEOLOGIC ENVIRONMENT

McGregor, R. and L. Benevenuto. I Frontiers in Environmental Chemistry 2:729779(2021)

The effect of heterogeneity on colloidal activated carbon (CAC) distribution and subsequent PFAS treatment at a site with a multiple-aquifer system was evaluated in a pilot study. Geology varied from silty sand to sand to fractured bedrock, with all three units being impacted by PFAS and BTEX). Parameters evaluated included CAC distribution and subsequent PFAS and BTEX treatment. Groundwater sampling indicated that PFAS contamination was effectively treated to below their respective reporting limits during the one-year test in both the silty sand and sand aquifers. PFAS in the fractured rock aquifer showed a different treatment profile with longer carbon-chain PFAS attenuating preferentially than the shorter carbon-chain PFAS. Results suggest that competitive sorptive reactions occurred on the CAC within the fractured rock. Analysis of the unconsolidated aquifer materials determined that direct push injection of the CAC effectively delivered it to the target injection zones, with post-injection total organic carbon (TOC) concentrations increasing by up to three orders of magnitude compared to pre-injection TOC concentrations. Heterogeneity impacted the CAC distribution, with higher hydraulic conductivity zones receiving more CAC mass than lower hydraulic conductivity zones. *This article is* ***Open Access*** *at* https://www.frontiersin.org/articles/10.3389/fenvc.2021.729779/full

Research

SYNERGISTIC REDUCTIVE DECHLORINATION OF 1,1,1-TRICHLOROETHANE AND TRICHLOROETHENE AND AEROBIC BIODEGRADATION OF 1,4-DIOXANE- PHASE II

Rittmann, B., R. Krajmalnik-Brown, C. Zhou, D. Friese, and Y. Tang. SERDP Project ER-2721, 99 pp, 2021

In Phase I of this project an H2-based membrane palladium-film reactor was used to convert 1,1,1- TCA and TCE to ethane by reductive dechlorination. The focus of Phase II was using O_2-MBfR to: 1) determine the minimum ethane concentration that supports sustained 1,4-dioxane biodegradation and whether that concentration is consistent with environmentally relevant 1,4-D and ethane levels; 2) determine if the minimum ethane concentration is culture-dependent or universal; 3) determine which bacteria are responsible for 1,4-D degradation when using ethane as the primary substrate; 4) use the mathematical model developed in Phase I to interpret the performance of the O_2-MBfR in terms of fundamental principles of microbial ecology and kinetics; and 5) estimate the cost of the O_2-MBfR for reliable operating conditions. Four O_2-based MBfRs were operated to assess their capability for long-term removal of 1,4-D, the required ethane input to sustain good removal of 1,4-D, and the microbial ecology of the biofilms. Batch experiments were conducted to quantify the kinetics associated with ethane and 1,4-D biodegradation. One modeling component interpreted the batch experiments to quantify the stoichiometric and kinetic parameters for ethane and 1,4-D biodegradation. The estimated parameters were then used to simulate and interpret the biodegradation of ethane and 1,4-D in the O_2-based MBfR using a biofilm model. The cost analysis was based on the experimental results and commercial experience with the MBfR. Research is needed to define the kinetic and stoichiometry parameters for microbial communities capable of biodegrading the low ethane and 1,4-D concentrations relevant to the O_2-MBfR to ensure that the platform performs reliably and cost-effectively at the pilot or field scale. Refined parameters will make it possible to predict optimum loading rates to take the 1,4-D concentration to https://www.serdp-estcp.org/content/download/55848/545617/file/ER-2721%20Final%20Report%20-%20Phase%20II.pdf

INTEGRATED INTERPRETATION OF MAGNETIC AND ERT DATA TO CHARACTERIZE A LANDFILL IN THE NORTHWEST OF COLOGNE, GERMANY

Ibraheem, I.M., B. Tezkan, and R. Bergers. I Pure and Applied Geophysics 178:2127-2148(2021)

Electrical resistivity tomography (ERT) and ground magnetic surveys were applied to characterize a landfill in a former exploited sand and gravel quarry near Cologne, Germany. A proton precession magnetometer recorded the total magnetic field and its vertical gradient in an

~43,250 m² area. The magnetic data were transferred to the frequency domain and then reduced to the north magnetic pole. The amplitude of the analytical signal was calculated to define the magnetic materials within and outside the landfill. Different electrode arrays (Wenner, dipole-dipole, and Schlumberger) were used to construct eight ERT profiles. A non-conventional mixed array was used to increase data coverage and sensitivity and decrease uncertainty. The subsurface resistivity distributions were imaged using the robust (L1-norm) inversion method, then the true resistivity data was used to generate 2D cross-sections and 3D fence diagrams. These non-invasive geophysical tools helped portray the soil cover, the spatial limits of the landfill, and the depth of the waste. ERT was also able to detect low resistivity zones, associated with migration pathways of leachate plumes, at deeper depths than expected.https://link.springer.com/content/pdf/10.1007/s00024-021-02750-x.pdf

WILLOWS USED FOR PHYTOREMEDIATION INCREASED ORGANIC CONTAMINANT CONCENTRATIONS IN SOIL SURFACE
Faubertm M.F., D. Desjardins, M. Hijri, and M. Labrecque. I Applied Sciences 11:2979(2021)

Sections of a 7-year-old mature willow plantation were cut to eliminate transpiration (cut treatment) to determine whether evapotranspiration and its impact on soil hydrology could increase soil pollutant concentrations near shrubs. Soil concentrations of PCBs, aliphatic compounds C10-C50, PAHs, Cd, Cr, Cu, Ni, and Zn were compared between the cut and the uncut plots (*Salix miyabeana* 'SX61'). After 2 years results showed that removal of the willow shrubs limited the increase of the contaminants in the soil surface, as observed for C10-C50 and 10 PAHs under the Salix treatment. Findings strongly reinforce a hypothesis that short-rotation intensive culture of willows may facilitate contaminant migration towards their roots, increasing concentrations in the surrounding soil. Such a "pumping effect" in a high-density willow crop is a prominent characteristic specific to field studies that can lead to counterintuitive results. Although apparent increases in contaminant concentrations contradict the purification benefits usually pursued in phytoremediation, the possibility of active phytoextraction and rhizodegradation is not excluded. Increases in pollutant concentrations under shrubs following migration suggest that decreases would occur at the source points. https://www.mdpi.com/2076-3417/11/7/2979/pdf

GROUNDWATER CHEMISTRY, HYDROGEOLOGIC PROPERTIES, BIOREMEDIATION POTENTIAL, AND THREE-DIMENSIONAL NUMERICAL SIMULATION OF THE SAND AND GRAVEL AQUIFER AT NAVAL AIR STATION WHITING FIELD, NEAR MILTON, FLORIDA, 2015-20
Landmeyer, J.E., E.D. Swain, C.D. Johnson, J.T. Lisle, W.S. McBride, D.H.
Chung, and M.A. Singletary., USGS Scientific Investigations Report 2021-5124, 68 pp, 2021

A study was conducted by the U.S. Geological Survey between 2015 and 2020 to assess the groundwater chemistry, hydrogeologic properties, bioremediation potential, and three-dimensional (3D) numerical simulations of groundwater flow in a sand and gravel aquifer at a Superfund site in northwestern Florida. Groundwater-quality samples were collected from representative monitoring wells located along a groundwater-flow pathway and analyzed in the field and lab. Ambient groundwater in the sand and gravel aquifer is acidic, dilute, and oxic. Groundwater age-dating results indicated recharge to the contaminated parts of the aquifer occurred between the 1970s and 1980s. Natural gamma, electromagnetic induction, and borehole nuclear magnetic resonance logs indicated that aquifer hydraulic conductivities generally increased with depth as the aquifer formation material became coarser, characteristic of a prograding marginal-marine delta depositional environment. Aquifer formation material incubated with radiocarbon (carbon-14) *cis*-1,2-DCE demonstrated biodegradation directly to carbon dioxide in contaminated and uncontaminated parts of the aquifer. A three-dimensional, numerical groundwater-flow MODFLOW model of the sand and gravel aquifer was constructed. The calibrated model reasonably reproduced measured groundwater heads and streamflows and can be used to run simulations of outcomes of potential remedial strategies, such as monitored natural attenuation, as part of future feasibility studies in the area. https://pubs.usgs.gov/sir/2021/5124/sir20215124.pdf

NUMERICAL MODELING OF GROUNDWATER FLOW IN THE CRYSTALLINE-ROCK AQUIFER IN THE VICINITY OF THE SAVAGE MUNICIPAL WATER-SUPPLY WELL SUPERFUND SITE, MILFORD, NEW HAMPSHIRE
Harte, P.T. USGS Scientific Investigations Report 2020-5137, 62 pp, 2021

USGS developed a numerical groundwater flow model to assess the groundwater flow and advective transport of PCE-contaminated groundwater of a crystalline-rock aquifer at the Savage Municipal Water-Supply Superfund site in Milford, New Hampshire. In 2010, PCE was detected in groundwater from fractures more than 300 ft deep in monitoring wells of the rock aquifer underlying the Milford-Souhegan glacial-drift aquifer, a high water-producing aquifer, and the Superfund site. Some nearby residential water-supply wells are likely installed in similar rock types and formations as monitoring wells at the Superfund site. Understanding the vulnerability of the residential water wells to capture PCE-contaminated groundwater was of concern. The model encompasses a 26.5-square-mile area to accurately calculate water fluxes near the PCE-contaminated monitoring and residential water wells. Simulations of the model using the 2016 configuration of residential wells show that capture of PCE by the residential water wells appears unlikely for hydrologic conditions based on steady-state, advective transport modeling. Simulations also show that adding residential water wells north of the PCE-contaminated monitoring wells could affect the transport of PCE. Groundwater withdrawals at adjacent wells in the overlying Milford-Souhegan glacial-drift aquifer affected advective transport in the crystalline-rock aquifer. Therefore, the potential for future changes in withdrawals in the area and changes in hydrologic conditions, including groundwater recharge and streamflow amounts, should be considered in the remedial assessment process.
https://pubs.usgs.gov/sir/2020/5137/sir20205137.pdf

MULTISCALE APPROACHES TO INVESTIGATE PFAS TRANSPORT AND ADSORPTION IN THE UNSATURATED ZONE
Gnesda, W. I 2022 Emerging Contaminants in the Environment Conference, 27-28 April, Champaign, IL, 16 slides, 2022

This study quantified the adsorption behavior of several PFAS and linked lab measurements to field-scale models. The surface tension of many PFAS were measured to approximate air-water adsorption. Solid-phase sorption to sediments underlying the Oneida-Rhinelander Airport, WI was quantified by batch-sorption experiments. Analyses were completed using LC/MS. Results are expected to verify theoretical frameworks and develop strong foundations for PFAS risk assessment.
https://www.ideals.illinois.edu/bitstream/handle/2142/114123/Gnesda_William_ECEC22.pdf?sequence=2&isAllowed=y

General News

NATURAL ATTENUATION AND BIOSTIMULATION FOR IN SITU TREATMENT OF 1,2-DIBROMOETHANE (EDB)
Koster van Groos, P., P. Hatzinger, G. Lavorgna, P. Philip, and T. Kuder. ESTCP Project ER-201331, 782 pp, 2022

The goals of this project were to improve understanding of EDB attenuation, particularly novel compound-specific isotope analysis tools, and determine whether biostimulation or bioaugmentation could effectively enhance in situ treatment of EDB. Improved methods to measure carbon isotope composition with low EDB concentrations were developed and applied. Differences in the isotopic composition of EDB among field samples provided valuable insights into EDB degradation processes. A lactate-based anaerobic in situ bioremediation approach was also applied in an impacted source area for chlorinated VOCs. The ISB effort aimed to demonstrate that higher EDB concentration source areas can be treated when attenuation processes are insufficient to protect receptors. https://www.serdp-estcp.org/content/download/55736/544687/file/ER-201331%20Final%20Report.pdf

BRIDGING THE GAP FROM REMEDY-IN-PLACE (RIP) TO RESPONSE COMPLETE (RC)
Sirabian, R., M. Singletary, and M. Gonzales. NAVFAC Open Environmental Restoration Resources Webinars #24 and 25, 61 and 60 minutes, 2021

The NAVFAC Optimization and Technology Innovation group developed a strategy to support sites of varying complexity transition from the RIP milestone to the RC milestone. This OER2 webinar series discusses the RIP/RC strategy and other policies and tools relevant to current programmatic goals, including the new Navy ER Program metrics for the RC milestone. The first part focuses on strategies and requirements for the transition from RIP to RC and presents a case study for a low complexity site. The second part focuses on case studies for more complex sites.
Part 1: Strategies and Requirements Presentation:
https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/oer2/bridging-the-gap-from-rip-to-rc/Bridging%20the%20Gap%20from%2
Part 1: Strategies and Requirements Recording: https://www.youtube.com/watch?v=LVrXDgtxmaM&list=PLs5WqQtrDryYk61kXQAeqghF9jH8RmDhJ&index=6
Part 2: Practical Examples Presentation:
https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/oer2/bridging-the-gap-from-rip-to-rc/Bridging%20the%20Gap%20from%2
Part 2: Practical Examples Recording: https://www.youtube.com/watch?v=IdRvQxSSPDI&list=PLs5WqQtrDryYk61kXQAeqghF9jH8RmDhJ&index=7

PHYTOREMEDIATION OF POTENTIALLY TOXIC ELEMENTS (PTES) CONTAMINATED SOILS USING ALFALFA (MEDICAGO SATIVA L.): A COMPREHENSIVE REVIEW
Chen, L., J. Beiyuan, W. Hu, Z. Zhang, C. Duan, Q. Cui, X. Zhu, H. He, X. Huang, and L. Fang. I Chemosphere 293:133577(2022)

This literature review determined alfalfa's potentially toxic element (PTE) uptake, phytotoxicity, tolerance mechanisms, and techniques to improve phytoremediation efficiency. Alfalfa showed high amounts of PTEs accumulation, especially in their root tissue. The inner mechanisms of PTE tolerance and accumulation in alfalfa include the activation of the antioxidant enzyme system; subcellular localization, production of glutathione, phytochelatin, and proline; and regulation of gene expression. Excessive PTE can overcome the defense system, which causes oxidative damage in alfalfa plants, inhibiting growth and physiological processes and weakening the ability of PTE uptake. Several approaches were developed to improve PTE's tolerance and/or accumulation in alfalfa plants, such as selecting PTE tolerant cultivars; applying plant growth regulators; adding chelating agents, fertilizer, and biochar materials; and inoculating with soil microbes. Selecting PTE-tolerant cultivars and inoculating with soil microbes may be an efficient and eco-friendly phytoremediation strategy for PTE-contaminated soil.

MANAGEMENT OF LARGE DILUTE PLUMES OF CHLOROETHENES AND 1,4-DIOXANE VIA MONITORED NATURAL ATTENUATION (MNA) AND MNA AUGMENTATION
Rhea, L.K. and C. Clark. Remediation 32(1-2):97-118(2022)

This article summarizes EPA research on monitored natural attenuation (MNA) of CVOC plumes produced in the past twenty years, including evidence of the biological degradation of dioxane. Based on the summarized reports, EPA work documented elsewhere, and the work of others, under appropriate conditions, MNA or augmented MNA remain viable management options for CVOC plumes. Unlike MNA of plumes containing only CVOCs, however, MNA of large dilute comingled plumes should be expected to occur by cometabolic oxidation rather than direct metabolic processes.

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