Technology Innovation News Survey

Entries for August 16-31, 2017

Market/Commercialization Information

MULTIPLE ENVIRONMENTAL GOVERNMENT ACQUISITION (MEGA)-RESTRICTED

U.S. Army Corps of Engineers, USACE HNC, Huntsville, AL.

Federal Business Opportunities, FBO-5780, Solicitation W912DY-16-R-0077, 2017 This solicitation is being offered as a restricted acquisition with awards set aside for small business concerns under NAICS code 562910 (Remediation Services). The Government anticipates award to a target of 5 eligible small businesses. This MEGA-restricted contract will support work assigned to the U.S. Army Corps of Engineers, including but not limited to the Defense Environmental Restoration Program; FUDS; MMR for various Defense customers, including conventional munitions and other munitions-related services; Defense Environmental Compliance Program; Environmental Support for Others Program; support to U.S. EPA, including Superfund and Brownfield programs; FUSRAP; environmental cleanup for various military customers; environmental stewardship; and other environment-related regulatory programs. The multiple-award IDIQ contract will consist of a 3-year base period and a single 2-year option. The pool of contractors will share the total contract capacity of $400M. Task orders issued under this multiple-award IDIQ contract may be firm-fixed-price or cost-plus-fixed-fee for sites located throughout the United States, including Alaska and Hawaii, the U.S. territories, outlying areas as defined by FAR 2.101, and territorial waters. Responses must be received by 2:00 PM CT on November 30, 2017.
https://www.fbo.gov/spg/USA/COE/DACA87/W912DY-16-R-0077/listing.html

ENVIRONMENTAL SERVICES

U.S. Army Corps of Engineers, USACE District St. Louis, MO.
Federal Business Opportunities, FBO-5787, Solicitation W912P917R0055, 2017

This solicitation will be set aside for woman-owned small business (WOSB) firms. The U.S. Army Corps of Engineers, St. Louis District, plans to seek firms for environmental remediation construction efforts that include remedial design, remedial action, and remedial excavations of contaminated material at pre-determined depths; HTRW manifesting; utility relocation; water management; engineering support; and construction support. The anticipated work lies within the geographic boundaries of the Mississippi Valley Division and U.S. EPA Regions 5 and 7. Solicitation W912P9-17-R-0055 will be an RFP for lowest-price technically acceptable proposals. Contract duration is five years. The NAICS code for the work is 541620 (Environmental Consulting Services), with an SBA size standard of $15M. Release of the solicitation is anticipated on FedBizOpps on or about October 9, 2017.
https://www.fbo.gov/notices/106dd6fa43c17c865b58b8f17de28425

Cleanup News

WEST VALLEY DEMONSTRATION PROJECT ANNUAL SITE ENVIRONMENTAL REPORT FOR CALENDAR YEAR 2016

U.S. Department of Energy, DOE-WVDP, 289 pp, 2017

A pilot-scale permeable treatment wall (PTW) was constructed in 1999 with a clinoptilolite reactive zone selected for its ability to adsorb strontium-90 ions from groundwater. Data collected during the PTW pilot test helped determine that the PTW technology was an effective remediation method for strontium-90-contaminated groundwater. In November 2010, a full-scale PTW 860 ft in length was installed to intercept the north plateau strontium-90 plume. The PTW has operated successfully for over six years. Granular clinoptilolite (i.e., zeolite), a natural mineral with a porous structure that traps positively charged ions by ion exchange, including strontium, while allowing the groundwater to pass through, serves as the treatment medium in the PTW. A lined storm water drainage ditch (Smart-Ditch™) was also installed in September 2010 south of the PTW to intercept storm water from upland site areas and route it around the PTW to Franks Creek. Three wells within the still-functioning pilot-scale PTW were monitored in 2016 to support delineation of plume flow and transport across the north plateau. https://www.osti.gov/scitech/servlets/purl/1389263

REMEDIAL ACTION PLAN: WYETH LLC, BUILDING G, 590 EAST INTERNATIONAL SPEEDWAY BOULEVARD, DELAND, VOLUSIA COUNTY, FLORIDA

Wyeth Building G Informational Website, 168 pp, 2016

This Remedial Action Plan presents a performance-based approach and design for remediation of chlorinated VOC (PCE, TCE, cis-1,2-DCE, and VC) groundwater impacts using soil mixing with large-diameter augers combined with injection of steam and zero-valent iron (ZVI), followed by natural attenuation monitoring. VOCs and steam will be recovered from heated subsurface zones by utilizing a surface shroud under applied vacuum, and recovered vapors and liquids will be separated in a vapor conditioning system. Following thermal treatment, ZVI slurry injections will address potential residual VOCs. Injecting a bentonite mixture at select depths will create a zone of lower permeability similar to that provided by the existing clay layers. Real-time process monitoring and contaminant recovery data will be collected to direct in-field remedial decision-making. The goal of the remedial action is to reduce PCE concentrations in groundwater within the treatment area to less than the natural attenuation default concentration of 300 µg/L. [Note: FDEP approved this remedial action plan on August 30, 2016.]
http://building-g.com/wp-content/uploads/2016/05/Wyeth_Bldg-G_RAP.pdf

Demonstrations / Feasibility Studies

BIOSPARGING PILOT TEST IN CONFINED AQUIFER

Snyder, J., V. Mustafin, and T. Curley.
RemTEC Summit, 7-9 March 2017, Denver, Colorado. Poster, 2017

A confined aquifer biosparging pilot test was performed at the Former Laguna Mart, Laguna Pueblo, New Mexico, following extensive soil excavation. Residual contamination remained in two water-bearing zones: (1) the water table and (2) a deeper zone beneath a 2 ft thick clay aquitard where black-stained residual NAPL was encountered. The test wells had sparge points installed 20 ft below the confining layer. Sparge points facilitated air injection, and deep monitoring wells, existing wells, and vent wells provided observation points. For pressure/flowrate response testing in the two sparge wells, pressure stepped from 23 psig to 25.5 psig resulted in flowrate increase from 1 scfm to 2.5 scfm in one well, and in the other, stepping from 10.5 and 19.5 psig resulted in flowrate increase from 0.75 scfm to 2 scfm. A flow rate 2 levels was seen in the shallow SVE system, indicating no communication. Design parameters included radius of air sparge influence as far as 25 ft, initial short-term emission rate of 0.0.075 lb/hr/scfm, and sparge pressure of 25 to 30 psig. A mass removal/destruction rate of ~14,500 lb/yr was estimated based on air stripping and in situ bioremediation based on oxygen delivery. The pilot test demonstrated the viability of sparging a confining aquifer. The remedial design was completed, the system was installed, and operation is pending. The system consists of over 90 vent and sparge wells in the water table and confined aquifer.

BIOELECTROCHEMICALLY ENHANCED BIODEGRADATION OF BENZENE IN GROUNDWATER

Jin, S.
RemTEC Summit, 7-9 March 2017, Denver, Colorado. Poster, 2017

The bioelectrochemical E-Redox technology stimulates bio-oxidation reactions of contaminants by providing an electron transfer conduit and expediting the electron transport in the impacted matrix, via electrodes and a conductive circuit to a perpetual electron acceptor. This technology consumes no energy during operation; instead, it generates electricity thanks to the electron flow within the system. Field pilot tests were conducted at fuel station sites in the area of Denver, Colorado, where the main contaminant of concern was benzene. The constant generation of electrical voltages in the installed bioelectrochemical devices during the field application also served as an important monitoring parameter for active biodegradation. Within 4 months after E-Redox field implementation, benzene concentrations in the groundwater decreased by more than 90% to 50% reductions in other petroleum hydrocarbon concentrations were observed. The field pilot demonstrated that bioelectrochemical technology can enhance benzene biodegradation with zero energy and consumable material input. *For more information on the E-Redox technology*: http://www.aetecs.com/yahoo_site_admin/assets/docs/ERedox_WhitePaper.297193712.pdf.

ORGANIC BIOREACTOR PILOT STUDY WORK PLAN

Colorado Department of Public Health and Environment, 44 pp, 2017

The Cotter Corporation proposes to construct and operate a pilot-scale organic bioreactor at the Cañon City Milling Facility (CCMF), Cañon City, Colorado. This pilot study is being conducted as part of the remedial investigation/feasibility study as discussed in the Administrative Settlement and Order on Consent. In July 2016, Cotter began a series of experiments to determine if an organic substrate can remove uranium and molybdenum effectively from contaminated groundwater collected from the site. The studies identified the feasibility of using a hardwood mulch bioreactor to remove U and Mo to concentrations below site standards. Construction of a pilot-scale bioreactor at the CCMF is planned to test the hypothesis that a bioreactor can be used to recycle water that is currently evaporated for use in reducing groundwater contaminant concentrations at the CCMF. The bioreactor will be constructed within Test Trench TR-9, located in the Old Ponds Area of the CCMF. TR-9 intercepts groundwater and appears to be in a permeable flow path. Details of the pilot construction—i.e., a design for constructing, operating, and monitoring the pilot bioreactor—are found in Attachment A of this report. http://recycle4colorado.ipower.com/Cotter/2017/170320-Final-Organic-Bioreactor-Proposed-Work-Plan.pdf

EFFECTS OF TIDAL OPERATION ON PILOT-SCALE HORIZONTAL SUBSURFACE FLOW CONSTRUCTED WETLAND TREATING SULFATE RICH WASTEWATER CONTAMINATED BY CHLORINATED HYDROCARBONS

Chen, Z., J. Vymazal, and P. Kuschk.
Environmental Science and Pollution Research 24(1):1042-1050(2017)

Three different flow regimes were carried out in a pilot-scale horizontal subsurface-flow constructed wetland treating sulfate-rich wastewater contaminated with monochlorobenzene (MCB) and PCE. The three regimes were continuous flow, 7-day cycle discontinuous flow, and 2.5-day cycle discontinuous flow. Results show that intensifying the tidal regime (2.5-day cycle) enhanced MCB removal significantly within 2 m from the inlet and increased PCE removal efficiency at 0.5 m. PCE dechlorination was promoted during tidal operation, especially under the 2.5-day cycle regime, with significant increases of DCE, VC, and ethene, although trans-1,2-DCE decreased significantly following tidal operation. Due to the high sulfate concentration in the influent, sulfide was observed in pore water up to 20 and 23 mg/L under continuous flow and 7-day cycle regimes, respectively, but sulfide concentrations fell to

IN SITU REMEDIATION OF TETRACHLOROETHYLENE AND ITS INTERMEDIATES IN GROUNDWATER USING AN ANAEROBIC/AEROBIC PERMEABLE REACTIVE BARRIER

Liu, S.-J., Q.-M. Yang, Y.-K. Yang, H. Ding, and Y. Qi.
Environmental Science and Pollution Research [published online 2017 prior to print]

An anaerobic/aerobic permeable reactive barrier (PRB) system consisting of four different functional layers was designed to remediate PCE-contaminated groundwater. The first (oxygen capture) layer maintained the dissolved oxygen (DO) concentration at 11.3 mg/L within influent supplied to the fourth (aerobic) layer. Results show that 99% of PCE was removed, mostly within the second (anaerobic) layer. The toxic by-products TCE, DCE, and VC were further degraded by 98, 90, and 92%, respectively, in layer 4 (aerobic). The anaerobic/aerobic PRB thus could control both PCE and its degradation by-products.

Research

EFFICACY OF AN IN-WELL SONDE TO DETERMINE MAGNETIC SUSCEPTIBILITY OF AQUIFER SEDIMENT

Wiedemeier, T.H., B.H. Wilson, M.L. Ferrey, and J.T. Wilson.
Groundwater Monitoring and Remediation 37(2):25-34(2017)

Abiotic degradation of chlorinated solvents by magnetite can be an important mechanism for natural attenuation of these contaminants. The quantity of magnetite in aquifer materials can be estimated by measuring the materials' magnetic susceptibility, which is most commonly done by determining the magnetic susceptibility of core samples in an analytical laboratory using a magnetic susceptibility meter. The cost of acquiring core samples can make an evaluation of abiotic degradation by magnetite economically unrealistic, but this paper suggests another avenue for the determination of magnetic susceptibility in the form of downhole sondes (probes). In an investigation of the use of a downhole sonde as an affordable alternative to acquiring and analyzing core samples, the sonde was introduced into 10 monitoring wells. Data from the sonde then were compared to data from core samples collected from the same elevation. The core samples analyzed in the lab were used as the standard against which to compare the sonde data. The downhole sonde reported values similar to those reported on core samples. At most wells, the means of the two measurements could not be distinguished at the 95% confidence interval. When the means could be distinguished, they still agreed within a factor of two. *Additional information on this study is available in an ESTCP factsheet at* https://www.serdp-estcp.org/content/download/45673/425856/file/ER-201584.

ASSESSING THE POTENTIAL CONSEQUENCES OF SUBSURFACE BIOREMEDIATION: FE-OXIDE BIOREDUCTIVE PROCESSES AND THE PROPENSITY FOR CONTAMINANT-COLLOID CO-TRANSPORT AND MEDIA STRUCTURAL BREAKDOWN

Radosevich, M., J. Zhaung, and S. Schaeffer.
SERDP Project ER-2130, 37 pp, 2017

Bioremediation typically involves manipulation of the physical and chemical environment to achieve conditions that will stimulate the desired biotic or abiotic processes necessary to degrade or immobilize contaminants in situ. However, even though contaminant biotransformation may be achieved, alteration of the chemical environment may promote unintended processes that accelerate or retard subsequent fate and transport of residual contaminants or degrade groundwater quality. For example, many subsurface bioremediation approaches involve the introduction of carbon substrates such as acetate or lactate (i.e., electron donors) that stimulate anaerobic respiration whereby solid phase mineral oxides of Fe and Mn serve as electron acceptors. During this process, oxidized forms of iron are reduced to Fe(II), solubilizing the iron oxide. Secondary precipitation of iron then can result in the formation of colloidal iron minerals. Adsorption of residual contaminants to these colloids can facilitate contaminant transport. Additionally, given sufficiently significant microbial biomass production and colloid generation, pore clogging may occur, thus reducing the hydraulic conductivity of porous media. This alteration of the indigenous properties of subsurface media can significantly affect coupled processes that control contaminant bioremediation, such as secondary mineral precipitates, permeability, and changes in microbial activity.
https://www.estcp.com/content/download/45605/425348/file/ER-2130%20Final%20Report.pdf

UNINTENTIONAL CONTAMINANT TRANSFER FROM GROUNDWATER TO THE VADOSE ZONE DURING SOURCE ZONE REMEDIATION OF VOLATILE ORGANIC COMPOUNDS

Chong, A.D. and K.U. Mayer. Journal of Contaminant Hydrology 204:1-10(2017)

In benchtop column experiments conducted to quantify the effect of gas generation during remediation of TCE, gas exsolution and ebullition occurred for both in situ chemical oxidation (ISCO) using potassium or sodium permanganate and enhanced bioremediation via primary substrate addition. Facilitated by ebullition, TCE was transported from the source zone into overlying clean groundwater and subsequently released into the column headspace. During enhanced bioremediation, the intermediate degradation product VC was also stripped from the treatment zone. The concentrations measured in the headspace of the columns (TCE ~300 ppm, ISCO column; TCE ~500 ppm and VC ~1380 ppm, bioremediation column) indicate that substantial transfer of VOCs to the vadose zone is possible. These findings provide direct evidence for the unintended spreading of contaminants as a result of remediation efforts, which under some circumstances can enhance risks for soil vapor intrusion. *See more information in A.D. Chong's thesis at* https://open.library.ubc.ca/media/download/pdf/24/1.0224815/4.

PERFORMANCE ASSESSMENT OF PUMP-AND-TREAT SYSTEMS

Truex, M., C. Johnson, T. Macbeth, D. Becker, K. Lynch, D. Giaudrone, A. Frantz, and H. Lee.
Groundwater Monitoring & Remediation 37(3):28-44(2017)

Decisions regarding major changes in the environmental remediation approach are an important element of remediation management for a site using a pump-and-treat (P&T) system. This paper describes a structured approach for P&T performance assessment using analysis of three example P&T systems. The examples highlight key aspects of the performance assessment decision logic and represent assessment outcomes associated with system optimization, transition to natural attenuation, and P&T supplementation with another technology. *For additional information on the structured approach to P&T performance assessment, see report PNNL-24696 and a training video at* http://bioprocess.pnnl.gov/Pump-and-Treat.htm.

RESPONSE OF MARINE BENTHIC FAUNA TO THIN-LAYER CAPPING WITH ACTIVATED CARBON IN A LARGE-SCALE FIELD EXPERIMENT IN THE GRENLAND FJORDS, NORWAY

Samuelsson, G.S., C. Raymond, S. Agrenius, M. Schaanning, G. Cornelissen, J.S. Gunnarsson.
Environmental Science and Pollution Research 24(16):14218-14233(2017)

A field study of thin-layer capping was conducted in the Grenland fjords, Norway, for in situ remediation of mercury- and dioxin-contaminated sediments. Areas at 30 and 95 m depth were capped with (i) powdered activated carbon (PAC) mixed with clay (PAC+clay), (ii) clay, and (iii) crushed limestone. Ecological effects on the benthic community and species-feeding guilds were studied 1 and 14 months after capping, with 158 species analyzed in total. Clay and limestone had only minor effects on the benthic community, whereas PAC+clay caused severe perturbations, reducing the abundance, biomass, and number of species by up to 90% at both 30 and 95 m depth. Few indications of recovery were found during the period of this investigation. The negative effects of PAC+clay were observed on a wide range of species with different feeding strategies, although the suspension-feeding brittle star *Amphiura filiformis* was particularly affected. Although activated carbon can reduce sediment-to-water fluxes of dioxins and other organic pollutants effectively, capping with PAC can lead to substantial disturbances to the benthic community. *This paper is* ***Open Access*** *at* https://link.springer.com/article/10.1007/s11356-017-8851-6.

IN SITU STABILIZATION OF NAPL CONTAMINANT SOURCE-ZONES AS A REMEDIATION TECHNIQUE TO REDUCE MASS DISCHARGE AND FLUX TO GROUNDWATER

Mateas, D.J., G.R. Tick, and K.C. Carroll. Journal of Contaminant Hydrology 204:40-56(2017)

A remediation method was developed to reduce the aqueous solubility and mass flux of COCs within NAPL through the in situ creation of a NAPL mixture source-zone. This technique relies on the stabilization of difficult-to-access NAPL sources to reduce COC mass flux to groundwater. A specific amount (volume) of relatively insoluble n-hexadecane (HEXDEC) or vegetable oil (VO) was injected into a TCE contaminant source zone through a bench-scale flow-cell port (i.e., well) to form a NAPL mixture of targeted mole fraction (TCE:HEXDEC or TCE:VO). The NAPL-stabilization flow-cell experiments initiated and sustained significant reductions in COC concentration and mass flux due to a combination of both reduced relative permeability (increased NAPL saturation) and modification of NAPL composition (decreased TCE mole fraction). VO injection caused TCE concentrations and mass flux to decrease more rapidly than did HEXDEC injection; the injected VO was observed to mix more uniformly with TCE in the source zone due to a lower mobilization potential. The relative lower density differences (buoyancy effects) between VO and the flushing solution (water) was the primary factor contributing to the lower mobilization potential for VO. Overall, delivery of HEXDEC or VO into the toxic TCE source zone was effective in significantly reducing contaminant aqueous-phase concentration and mass flux, although the effectiveness of this in situ NAPL stabilization technique depends on source delivery, uniform mixing of amendment, and continued amendment immobilization within and around the NAPL contaminant source.

POROSITY AND PORE SIZE DISTRIBUTION IN A SEDIMENTARY ROCK: IMPLICATIONS FOR THE DISTRIBUTION OF CHLORINATED SOLVENTS

Shapiro, A.M., C.E. Evans, and E.C. Hayes. Journal of Contaminant Hydrology 203:70-84(2017)

Characterizing properties of the rock matrix that control retention and release of chlorinated solvents is essential in evaluating the extent of contamination and the application of remediation technologies in fractured rock. Core samples from seven closely spaced boreholes in a mudstone subject to TCE contamination were analyzed using mercury-intrusion porosimetry to investigate porosity and pore size distribution as a function of mudstone characteristics and depth and lateral extent in the aquifer; organic carbon content was also evaluated to identify the potential for adsorption. Porosity and retardation factor varied over two orders of magnitude, with the largest porosities and largest retardation factors associated with carbon-rich mudstone layers. Larger porosities were also measured in the shallow rock that has been subject to enhanced groundwater flow. Porosity varied over more than an order of magnitude in spatially continuous mudstone layers. Analyses of the rock cores indicated that the largest pore diameters might be accessible to entry of the nonaqueous form of TCE. Although the porosity associated with the largest pore diameters is small (~0.1%), that volume of TCE can affect total TCE retained in the rock matrix significantly. The dimensions of the largest pore diameters may also be accessible to microbes responsible for reductive dechlorination, although the small percentage of the pore space that can accommodate microbes may limit reductive dechlorination extent in the rock matrix.

OVERVIEW OF NATURAL SOURCE ZONE DEPLETION: PROCESSES, CONTROLLING FACTORS, AND COMPOSITION CHANGE

Garg, S., C.J. Newell, P.R. Kulkarni, D.C. King, D.T. Adamson, M.I. Renno, and T. Sale.
Groundwater Monitoring & Remediation 37(3):62-81(2017)

Natural source-zone depletion (NSZD) has emerged as a practical alternative for restoration of LNAPL sites that are in the later stages of remediation. The NSZD conceptual model has evolved dramatically in recent years, and methanogenesis is now accepted as a dominant attenuation process. Most of the methane is generated within the pore space adjacent to LNAPL whence it migrates through the unsaturated zone, where it is oxidized. While great progress has been made, important gaps remain in the general understanding of NSZD: NSZD measurements provide little insight on which constituents are actually degrading; it is unclear which rate-limiting factors can be manipulated to increase NSZD rates; and methods to predict the longevity of the bulk LNAPL and its key constituents remain to be determined. A study of the literature identified several processes that might influence NSZD or its measurement. *This paper is* ***Open Access*** *at* http://onlinelibrary.wiley.com/doi/10.1111/gwmr.12219/full.

IMPACT OF TEMPERATURE ON GROUNDWATER SOURCE ATTENUATION RATES AT HYDROCARBON SITES

Kulkarni, P.R., D.C. King, T.E. McHugh, D.T. Adamson, and C.J. Newell.
Groundwater Monitoring & Remediation 37(3):82-93(2017)

The temperature sensitivity of microbial populations is reflected in measured source attenuation rates at hydrocarbon-impacted sites. To evaluate the correlation between temperature and source attenuation rates (concentration vs. time attenuation rate over many years) of benzene and toluene, researchers analyzed groundwater monitoring data from >2000 hydrocarbon sites. The analysis identified

statistically significant and positive relationships between temperature and source attenuation rates for benzene and toluene, indicating that temperature does affect hydrocarbon degradation but is one of many factors that contribute to source attenuation. A 1.1 to 1.6 times increase in attenuation rates per 10°C increase in temperature was observed. The temperature-degradation rate relationship was stronger at sites with deeper water tables (>30 ft), which were less susceptible to oxygen influx than sites with shallow water tables (See additional information on the effects of temperature at http://www.gsi-net.com/en/publications/publications/thermal-nszd-pdf.html *and in 57 slides at* http://taep.memberclicks.net/assets/Luncheon/2016/gsi_thermalnszd_taep_9-17-16.pdf.

PERFORMANCE OF DIFFERENT OXIDANTS IN THE PRESENCE OF OXISOL: REMEDIATION OF GROUNDWATER CONTAMINATED BY GASOLINE/ETHANOL BLEND
Andrade, L.N., S.F. Araujo, A.T. Matos, A.B. Henriques, L.C. Oliveira, P.P. Souza, P. Chagas, et al. Chemical Engineering Journal 308:428-437(2017)

Sodium persulfate ($Na_2S_2O_8$), potassium persulfate ($K_2S_2O_8$), hydrogen peroxide (H_2O_2, and calcium peroxide (CaO_2) were tested for remediation of groundwater contaminated by a gasoline/ethanol blend. In fuel spills, groundwater acquires high organic carbon content and a considerable amount of BTEX, and can be treated using in situ chemical oxidation (ISCO). Batch tests were conducted to select the best oxidant, which established in the presence of oxisol (soil rich in iron) the proper conditions for generation of radicals. Results indicated that the H_2O_2 was scavenged in the process and that Ca_2, which releases H_2O_2 slowly, achieved the best removal results. However, Ca_2 has low solubility, forms precipitates, and increases pH to 12; therefore, ($Na_2S_2O_8$) was selected instead because it achieves good removal results, works at low pH values, and has slow kinetics, making it suitable for groundwater remediation. Tests revealed that the concentration of iron in a ferriferous oxisol promoted proper oxidant activation, achieving 99% BTEX removal and 45% COD removal. GC-MS analysis of the oxidized samples showed the formation of intermediates (e.g., acetic acid and 1-acetic anhydride with formic acid) indicating the remediation pathway. The soil control sample also achieved considerable DOC removal, suggesting that the use of ISCO may speed the remediation process, but the soil itself has a mechanism to degrade this kind of organic matter. http://journal-dl.com/downloadpdf/591086253fbb6e13742715b7

EFFECTS OF CHANGES IN PUMPING ON REGIONAL GROUNDWATER-FLOW PATHS, 2005 AND 2010, AND AREAS CONTRIBUTING RECHARGE TO DISCHARGING WELLS, 1990-2010, IN THE VICINITY OF NORTH PENN AREA 7 SUPERFUND SITE, MONTGOMERY COUNTY, PENNSYLVANIA
Senior, L.A., and D.J. Goode.
U.S. Geological Survey Scientific Investigations Report 2017-5014:1-36(2017)

In 1979, groundwater in the vicinity of the North Penn Area 7 Superfund site was found to be contaminated with organic compounds, such as TCE. As part of technical support to U.S. EPA during the remedial investigation of the site from 2000 to 2005, USGS developed a model of regional groundwater flow to describe changes in groundwater flow and contaminant directions as a result of changes in pumping. Subsequently, large TCE concentration decreases (up to 400 µg/L) were measured in groundwater samples collected from selected wells in 2010 compared to 2005-2006 concentrations. To determine the effect of changes in pumping on flow paths and possibly on observed changes in spatial distribution of contaminants in groundwater from 2005 to 2010, USGS conducted simulations using the previously developed groundwater-flow model with reported pumping and estimated recharge rates for 2005 and 2010. Simulated groundwater flow paths shifted only slightly from 2005 to 2010 as a result of changes in pumping rates, indicating that the TCE concentration decreases might result from other processes, such as degradation or source removal, possibly at least partly related to soil excavation completed in 2005. https://pubs.er.usgs.gov/publication/sir20175014

General News

TOOLKITS FOR EVALUATION OF MONITORED NATURAL ATTENUATION AND NATURAL SOURCE ZONE DEPLETION
The Contaminated Sites Approved Professionals Society (CSAP Society), 176 pp, 2016

This document addresses common questions on the science underlying monitored natural attenuation and natural source-zone depletion for LNAPL contamination. It was developed to support remedial decision-making to address LNAPL source zones and associated plumes, typically after free-phase LNAPL has been remediated to the extent practicable and after determining there is no current unacceptable risk to human or ecological receptors. This report contains the first two of four planned toolkits: the Conceptual Site Model and Case Study Toolkit, and the Monitoring and Prediction Toolkit. The purpose of the toolkit approach is to summarize current knowledge and provide practical tools for practitioners. The Remediation Technology Toolkit and the Sustainability Toolkit are still in preparation. http://csapsociety.bc.ca/wp/wp-content/uploads/Monitored-Natural-Attenuation-Toolkit-for-Evaluation-1-and-2_combined-FINAL-.pdf

ENVIRONMENTAL ENGINEERING DICTIONARY OF TECHNICAL TERMS AND PHRASES
Hopcroft, F.J. et al.
Momentum Press, New York, 2017

Technical dictionaries have been developed that provide a list of ~300 technical terms and phrases common to environmental engineering that non-English speakers often find difficult to understand in English. The manuals provide the terms and phrases in alphabetical order, followed by a concise English definition, and then a translation of the term in the other language, and finally an interpretation or translation of the term or phrase in the other language. The columns then are reversed and reordered alphabetically in the other language with the English term and translation following the foreign term or phrase. The objective is to provide a technical term reference manual for non-English speaking students and engineers who are familiar with their own language but uncomfortable with English and to provide a similar reference for English-speaking students and engineers working in an area of the world where another language predominates. So far, the dictionaries are available in Arabic, Farsi, French, Italian, Mandarin, Polish, Portuguese, Romanian, Spanish, Tamil, Thai, and Vietnamese. *See more information at* http://www.momentumpress.net/taxonomy/term/122.

A GUIDE FOR USING GEOCHEMICAL METHODS IN DREDGED MATERIAL, SEDIMENT TRACKING, AND SEDIMENT BUDGET STUDIES
Wadman, H.M., D.W. Perkey, J.M. Seiter, M.A. Chappell, and B. Lafferty.
Engineer Research and Development Center, ERDC TR-17-3, 46 pp, 2017

Geochemical sedimentary markers provide a well-established methodology for fingerprinting the various sources and time frames over which sediment accumulates in regions of concern. This report outlines the basic methodology of how different geochemical signatures can be utilized to identify sediment sources and fates. The methodologies are then showcased in example real and hypothetical case studies. http://www.dtic.mil/get-tr-doc/pdf?AD=AD1035716

USER GUIDANCE FOR APPLICATION OF TREECS™ AND CTS FOR ENVIRONMENTAL RISK ASSESSMENT OF CONTAMINANTS ON DEPARTMENT OF DEFENSE (DOD) RANGES
Dortch, M.S., E.J. Weber, and B.E. Johnson.
ERDC/EL TR-17-8, 62 pp, 2017

The Training Range Environmental Evaluation and Characterization System (TREECS™) was developed for the Army to forecast the fate of and risk from munitions constituents (MC), such as high explosives and metals, within and transported from firing/training ranges to surface water and groundwater. TREECS™ requires chemical-specific properties as part of the inputs. The Chemical Transformation Simulator (CTS) was developed by U.S. EPA to provide physicochemical properties of complex organic chemicals. The CTS has capabilities for estimating chemical-specific properties in the absence of experimentally obtained properties; thus, CTS can help fill data gaps for properties, particularly for emerging MC that have limited experimental data. This report discusses the input requirements,

sources of input data, and lessons learned from applying TREECS™ and CTS.
https://www.estcp.com/content/download/45195/422282/file/ER-201435%20User%20Guidance.pdf

ENGINEERING TECHNICAL SUPPORT CENTER ANNUAL REPORT, FISCAL YEAR 2015
Bronstein, K. and J. McKernan. EPA 600-R-16-232, 33 pp, 2016

This report highlights selected projects that EPA's Engineering Technical Support Center (ETSC) supported throughout FY 2015. ETSC teams went into the field to spearhead projects at the cutting edge of remediation research in the areas of bioremediation and groundwater treatment, active sediment capping, in situ stabilization, and sustainable site cleanup. ETSC organized and reported significant developments in environmental engineering in several Engineering Issue papers as well as in peer-reviewed journal publications. Newer initiatives were undertaken that focus on integrating sustainability into communities and land-use plans. While ETSC's principal mission of bolstering technical expertise for site-specific remediation at contaminated sites remains a central focus, its teams are reaching out to support other efforts in prevention, thereby reducing EPA's future burden from legacy sites.
https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100QZ31.txt

PHYTOFORENSICS: USING TREES TO FIND CONTAMINATION
Wilson, J.L.
U.S. Geological Survey Fact Sheet 2017-3076:1-2(2017)

Environmental samples can characterize the extent of potential contamination, but traditional methods for collecting water, air, and soil samples below ground (for example, well drilling or direct-push soil sampling) are expensive and time-consuming. Trees are closely connected to the subsurface, and sampling tree trunks can indicate the presence of subsurface pollutants, a process called phytoforensics. Scientists at the Missouri Water Science Center were among the first to use phytoforensics for contamination screening prior to employing traditional sampling methods, to guide additional sampling, and to show the large cost savings associated with tree sampling compared to traditional methods. https://pubs.er.usgs.gov/publication/fs20173076

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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