Technology Innovation News Survey

Entries for February 16-28, 2018

Market/Commercialization Information

BIG RIVER MINE TAILINGS OPERABLE UNIT 1 REMEDIAL ACTION: RESIDENTIAL SOILS

U.S. EPA, Office of Acquisition Management, Region VII, Lenexa, KS.
Federal Business Opportunities, FBO-5956, Solicitation 68HE0718R0009, 2018

This procurement will be a total small business set-aside under NAICS code 562910. U.S. EPA Region 7 intends to seek the services of an experienced firm to provide remedial action services for residential properties affected by human transport of mine waste from Big River Tailings Superfund Site. The work to be performed under this contract consists of excavation, consolidation, disposal, and revegetation of mining wastes and contaminated soils at portions of OU-1. Remediation will be conducted pursuant to CERCLA. EPA anticipates issuing an IDIQ with fixed unit prices contract consisting of a one-year base period and two one-year option periods. The estimated dollar value for this procurement is between $10M and $20M. Release of the RFP is anticipated around or after April 2, 2018. Monitor FedConnect for updates at https://www.fedconnect.net/FedConnect/?doc=68HE0718R0009&agency=EPA [Note: It might be necessary to copy and paste the URL into your browser for direct access].

LONG-TERM MANAGEMENT, WELL INSTALLATION, PROPOSED PLAN AND ROD AT MAXWELL AFB, ALABAMA

Department of the Air Force, AFICA - CONUS, Maxwell Air Force Base, AL.
Federal Business Opportunities, FBO-5973, Solicitation FA8903-18-R-0037, 2018

This requirement is a 100% small business set-aside under NAICS code 562910 (size standard 750 employees). Requirements under this contract will primarily support environmental restoration, remediation, operations, and services at Maxwell AFB but also might include traditional minor construction, demolition, and repair. This project encompasses the installation of nine new wells and the sampling, analysis, and reporting associated with long-term management (LTM) requirements for four landfills at Maxwell AFB. The contract also includes preparation of a Proposed Plan/Record of Decision PP/ROD for the four landfills. The period of performance will be 12 months. The Government intends to award a single firm-fixed-price contract. Funds are not presently available for this effort. No award will be made under this solicitation until funds are available. Proposals must be received no later than 2:00 PM CT on May 3, 2018. https://www.fbo.gov/notices/ccabf95b4ecf743379fde7261936f07b

SAVANNAH RIVER SITE OPERATIONS (POST FY 2018) PROCUREMENT

U.S. DOE, EM Consolidated Business Center, Cincinnati, OH.
Federal Business Opportunities, FBO-5943, Solicitation 89303318REM000016, 2018

DOE anticipates issuing a DRAFT RFP for the Savannah River Site Operations Management & Operating Contract (Post FY 2018) in April or May 2018. The new contract will replace the Savannah River Nuclear Solutions LLC contract, which expires July 31, 2018. The new contract will provide the services DOE needs to continue to eliminate or minimize nuclear materials, spent nuclear fuel, and waste through safe stabilization, treatment, and/or disposition; reduce the costs of continuing operations, surveillance, and maintenance; decommission facilities; and remediate surface water, groundwater, and contaminated soils consistent with regulatory agreements and permits. SRS cleanup is expected to be completed in FY 2065. This procurement will be 100% full and open competition under NAICS code 562910 (Environmental Remediation Services). DOE/EM has established a dedicated webpage for this procurement at https://www.emcbc.doe.gov/SEB/SRSPostFY18Ops/.

Cleanup News

MARINE CORPS INSTALLATIONS WEST-MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA

Secretary of Defense Environmental Award Fiscal Year 2016: Submission for Environmental Restoration - Installation, 7 pp, 2017

Accelerated environmental cleanup at Camp Pendleton has included implementation of in situ thermal remediation at Installation Restoration Site 1115 to address TCE, DCE, naphthalene, benzene, and ethylbenzene in an area once used for vehicle maintenance, repair, painting, washing, and fuel service. Two groundwater plumes, one shallow and one deep, emanate from the area beneath paved surfaces. Operation of a multi-phase extraction system prior to active subsurface heating controlled groundwater migration through the thermal treatment zone and reduced the heating system's energy consumption. During 104 days of active heating, the effluent extraction and treatment system processed 1.4E+08 cubic feet of contaminant-laden off-gas and 1.8E+05 pounds of extracted liquids. IR site 1115 also was selected for a hydraulic fracturing pilot study whose results indicated that fracturing could enhance subsurface permeability sufficiently to allow in situ treatment. To address chlorinated herbicides at IR site 1120, Camp Pendleton implemented the Vapor Energy Generator (VEG) system, a mobile ex situ technology, to lower contaminant concentrations below detection limits. VEG technology relies on vapors generated during thermal soil treatment to serve as fuel for system operation. At IR Site 1119, a plume of dissolved-phase TCE is being addressed by source area treatment via in situ enhanced bioremediation and installation of a reactive barrier via injection wells downgradient of the source area.
https://www.denix.osd.mil/awards/2017secdef/environmental-restoration-installation/marine-corps-base-camp-pendleton-california/

FORT BRAGG, NORTH CAROLINA

Secretary of Defense Environmental Award Fiscal Year 2016: Submission for Environmental Restoration - Installation, 6 pp, 2017

During underground storage tank (UST) removals at Fort Bragg, innovative soil sampling and screening techniques used while performing UST removals saved ~$1M in lifecycle costs at four UST removal sites in 2015 and 2016. Adoption of the passive diffusion bag process as a primary method for groundwater monitoring resulted in a 95% reduction in investigation-derived waste and a 75% reduction in staffing for sampling and analytical services. "Green" cleanup techniques implemented at the facility include in situ enhanced anaerobic bioremediation, passive remediation and sampling, and natural attenuation.
https://www.denix.osd.mil/awards/2017secdef/environmental-restoration-installation/fort-bragg-north-carolina/

DEFENSE SUPPLY CENTER RICHMOND, VIRGINIA

Secretary of Defense Environmental Award Fiscal Year 2016: Submission for Environmental Restoration - Installation, 7 pp, 2017

Defense Supply Center Richmond is the home of the aviation demand and supply manager for the Defense Logistics Agency. Soil and groundwater contamination have been identified in 13 operable units on the installation, and in situ bioremediation is being implemented extensively. The remedy for the dissolved-phase chlorinated organics in OU-7 consists of in situ bioremediation coupled with land use controls and long-term MNA. The remedy was implemented in 2013 by installing 23 new injection wells in eight separate transects and injecting >22,300 gal of emulsified vegetable oil substrate into the wells, followed several years later by injection of an additional 20,000 gal of substrate. The facility is also implementing the bioremediation contingency remedy for OU-8 groundwater, which is contaminated by acid neutralization pits associated with past industrial metal-working operations. The remedy was put in place in 2013 by installing 15 injection wells for the introduction of >15,500 gal of emulsified vegetable oil substrate and lactic acid. The bioremediation remedy for OU-6 began in 2015, when ~54,000 gal of edible oil substrate and lactic acid was injected into the contaminant source zone through injection wells located in seven different transects targeting both the upper and lower water bearing units, followed by additional injections of 14,000 gal of edible oil substrate in 2016.
https://www.denix.osd.mil/awards/2017secdef/environmental-restoration-installation/defense-supply-center-richmond-virginia/

CLEANING UP
Foundations of Readiness: Journal of the Army National Guard 34-35(2018)

The Army National Guard (ARNG) cleans up hazardous substances left by historical operations at its active and formerly used installations. The cleanup of Camp Ravenna in Ohio, a former Army ammunition plant, is a high-profile project. The ARNG team focuses mainly on PAHs and metals in the soil. Excavation and removal typically is conducted if the contaminated soil zone is under 3,000 yd ^{3}, but for larger projects the team prefers the Vapor Energy Generator (VEG) technology. VEG technology involves thermal treatment with a patented filtration technology for air discharges. Once remediated, the soil can be retained on site. The project at Camp Ravenna started in February 2016, has achieved cleanup goals at some of the sites within the footprint, and is ongoing. The team also saves time and money through the use of a mobile onsite lab for high-resolution site characterization.
http://www.nationalguard.mil/Portals/31/Documents/ARNG/ARNG2018Installations.pdf

FIRST FIVE-YEAR REVIEW REPORT, HIAWATHA BOULEVARD FORMER MANUFACTURED GAS PLANT, SUBSITE OF ONONDAGA LAKE SUPERFUND SITE, ONONDAGA COUNTY, NEW YORK
U.S. EPA Region 2, 24 pp, 2017

The remedial investigation of the former manufactured gas plant revealed elevated levels of BTEX compounds, PAHs, and cyanide in groundwater and subsurface soils. The 2010 ROD remedy called for in situ solidification of subsurface soils from the northeastern portion of the subsite where NAPL was identified in lenses and PAHs were found at concentrations >500 mg/kg to depths of 22-24 ft bgs. About 9,700 yd ^{3} of contaminated soil was solidified. The remedy included enhanced biodegradation of groundwater through amendment injection along the northern property boundary to address high groundwater concentrations of BTEX and PAHs. In situ bioremediation field pilot study activities performed from September 2013 through June 2015 demonstrated that the indigenous sulfate-reducing microbial community was capable of degrading the MGP-related contaminants and that this degradation could be stimulated and enhanced by amending the groundwater with sulfate. The relatively slow groundwater velocity observed in the pilot study area allowed the use of a lower-solubility (slow-release) form of sulfate amendment (e.g., gypsum). Based on pilot results, full-scale deployment of sulfate amendments is being pursued. https://semspub.epa.gov/src/document/02/510540

Demonstrations / Feasibility Studies

RAPID ASSESSMENT OF REMEDIAL EFFECTIVENESS AND REBOUND IN FRACTURED BEDROCK: ESTCP COST AND PERFORMANCE REPORT
ESTCP Report ER-201330, 66 pp, 2017

A demonstration of the rapid assessment protocol was performed in shallow bedrock at Calf Pasture Point in Rhode Island, where TCE was the primary groundwater contaminant. While nearly 99% of the TCE was removed from the conductive fracture zone during initial flushing, substantial contaminant rebound (up to ~5% of TCE baseline concentration) was observed over the 5-month rebound period. The rate and extent of observed contaminant rebound was reasonably described using a matrix back-diffusion model and CSIA, both serving as lines of evidence that the observed rebound was due to matrix back-diffusion. The back-diffusion model further predicted that over a decade of treatment likely would be needed to reduce TCE concentrations by 99% in the conductive fractures. CSIA testing not only served as a line of evidence demonstrating that the rock matrix was the source of the observed rebound but also confirmed the occurrence of abiotic dechlorination of TCE and DCE within the rock matrix.
https://www.serdp-estcp.org/content/download/46795/437525/file/ER-201330%20Cost%20&%20Performance%20Report.pdf

FOURTH QUARTER AND ANNUAL 2016 MONITORING REPORT, LOUISIANA-PACIFIC CORPORATION, FORMER ELK CREEK SAWMILL; CASE NO. SL185212901
California Central Valley Regional Water Quality Control Board, 105 pp, 2017

Site investigations at this former sawmill detected diesel, pentachlorophenol (PCP), and tetrachlorophenol (TCP) in the soil and groundwater. A pilot test of in situ chemical oxidation (ISCO) for the PCP and TCP began in May 2016 under site-specific Order No. R5-2015-0012-016. Pilot-scale ISCO remediation activities were conducted in May, June, and September 2016, and groundwater monitoring was conducted through December 2016 in compliance with the site-specific monitoring and reporting program. During each of the three injection events, ~440 lb of persulfate mixed with ~400 gal of water was applied to three injection wells. The contractor requested termination of coverage for the project in this fourth quarter and annual 2016 monitoring report, which includes the pilot test monitoring data, concluding that persulfate was not effective at the site, even though previous bench-scale testing indicated reduced contaminant concentrations. Monitoring did not indicate any detrimental effects from the injections in the compliance wells. Further pilot testing of persulfate is not warranted. http://geotracker.waterboards.ca.gov/esi/uploads/geo_report/4158700764/SL185212901.PDF
See more information on the progress of this cleanup at http://geotracker.waterboards.ca.gov/profile_report?global_id=SL185212901.

Research

HISTORICAL RELEASES OF MERCURY TO AIR, LAND, AND WATER FROM COAL COMBUSTION
Streets, D.G., Z. Lu, L. Levin, A.F.H. ter Schure, and E.M. Sunderland.
Science of the Total Environment 615:131-140(2018)

Coal combustion is one of the largest contemporary sources of anthropogenic mercury (Hg). It releases geologically sequestered Hg to the atmosphere, and fly ash can contaminate terrestrial and aquatic systems. Coal combustion released an estimated cumulative total of 38.0 (14.8-98.9, 80% C.I.) Gg (gigagrams, 10^9 g or a thousand tonnes) of Hg to air, land, and water up to the year 2010, most of which (97%) occurred after 1850. The rate of release has grown by two orders of magnitude, from 0.01 Gg/yr in 1850 to 1 Gg/yr in 2010. Geographically, Asia and Europe each account for 32% of cumulative Hg releases and an additional 18% is from North America. About 26.3 (10.2-68.3) Gg or 71% of the total was emitted directly to the atmosphere, mostly from the industrial (45%) and power generation (36%) sectors, while the remainder was disposed of to land and water bodies. While Europe and North America were the major contributing regions until 1950, Asia has surpassed both in recent decades. By 2010, Asia was responsible for 69% of the total releases of Hg from coal combustion to the environment. Control technologies installed on major emitting sources capture mainly particulate and divalent Hg; hence, the fraction of elemental Hg in emissions from coal combustion has increased over time from 0.46 in 1850 to 0.61 in 2010. About 11.8 Gg of Hg or 31% of the total has been transferred to land and water bodies through disposal or utilization of Hg-containing combustion waste and collected fly ash/flue-gas desulfurization sludge; ~8.8 Gg of this Hg has simply been discarded to waste piles or ash ponds or rivers.

DECONTAMINATE PASSAIC RIVER SEDIMENTS USING ULTRASOUND WITH OZONE NANO BUBBLES
Meegoda, J.N., J.H. Batagoda, and S. Aluthgun-Hewage.
Proceedings of the 19th International Conference on Soil Mechanics and Geotechnical Engineering, Seoul, 2017. 3159-3162(2017)

Contaminants in the Passaic River include PAHs, PCDD/F, PCBs, DDT, and other pesticides and their by-products as well as heavy metals like Hg, Cr, and Pb. Researchers investigated the development of an in situ remediation technology using nanoscale ozone bubbles and ultrasound to decontaminate river sediments. Preliminary experimental results showed reasonable PAH removal efficiencies from contaminated sediments. The data obtained from the lab experiments will be used to develop a pilot-scale study for possible field application. https://www.issmge.org/uploads/publications/1/45/06-technical-committee-21-tc215-18.pdf

REMEDIATION OF THE ACIDIC GROUNDWATER IMPACTING THE DISCHARGE CANAL IN D AREA

Gaughan, T. | SRNS-J2000-2018-00131, 12 pp, 2018

The vadose zone and groundwater beneath the Old Coal Storage Area and the Coal Pile Runoff Basin at the Savannah River Site has been affected by low pH and dissolved metals over ~60 yr of power plant operation. The presence of a low-pH plume demonstrates that the buffering capacity of the sediments in the vadose zone and the aquifer has been overcome by sulfuric acid that has changed the charge of the soil from mostly negative to mostly positive such that dissolved metals present in the groundwater remain in solution. The coating of the sediment with hydrogen+ ion will allow the acid plume and impact on the discharge canal to persist for a very long time. Infiltrating water from the vadose zone and groundwater flowing into the acidic zone from upgradient will become strongly acidic when it comes into contact with the hydrogen+ ions in the sediments until most of the acidity is depleted. The sediments in D Area consist of relatively thinly interbedded sands, silts, and clays. The lack of massive clean sand strata does not support the injection of basic solutions to arrest the acid source term in the groundwater. The addition of alkaline earth metal solutions will tend to activate the clay bearing sediments near the site of injection, causing the clay to swell and likely reduce sediment permeability to a level where treatment is not possible. A more reliable method of treatment is to simply wash the hydrogen+ ion from the top of the water table with potable water and treat the acid conditions in the discharge canal. This paper offers a conceptual design of an injection well field and the expected effects on the water table surface. Acidic water treatment within the discharge canal can be provided by carbonate-reactive structures. It is likely that the in-field components of the remedy could be implemented for ~$600K.
https://www.osti.gov/biblio/1423999-remediation-acidic-groundwater-impacting-discharge-canal-area

DEEP VADOSE ZONE TREATABILITY TEST OF SOIL DESICCATION FOR THE HANFORD CENTRAL PLATEAU
Truex, M.J., G.B. Chronister, C.E. Strickland, C.D. Johnson, G.D. Tartakovsky, M. Oostrom, et al.
PNNL-26902, 318 pp, 2018

Some of the inorganic and radionuclide contaminants in the deep vadose zone at the Hanford Site are at depths where direct exposure pathways are not of concern, but remediation may be needed to protect groundwater. Desiccation was field-tested as a potential vadose zone remediation technology to be used in conjunction with a surface infiltration barrier for groundwater protection. The desiccation technology relies on removal of water from a portion of the subsurface such that the resultant low moisture conditions inhibit downward movement of water and dissolved contaminants. Overall objectives for the field test were to provide technical data as a design basis for desiccation, demonstrate desiccation at the field scale, and provide scale-up information for use in subsequent feasibility studies. In the 6-month duration of the field test, a subsurface zone ~10 ft thick out to a radius of ~10 ft was desiccated, creating conditions that reduced the rate of moisture and contaminant movement toward groundwater. The field test successfully provided information addressing key performance factors for desiccation.
https://www.osti.gov/biblio/1423418-deep-vadose-zone-treatability-test-soil-desiccation-hanford-central-plateau-final-report

INTERACTION OF MICROBIAL & ABIOTIC PROCESSES IN SOIL LEADING TO THE (BIO)CONVERSION AND ULTIMATE ATTENUATION OF NEW INSENSITIVE MUNITIONS COMPOUNDS
Field, J.A., J. Chorover, R. Sierra-Alvarez, L. Abrell, and J. Coffey II.
SERDP Project ER-2221, 204 pp, 2016

2,4-Dinitroanisole (DNAN) and 3-nitro-1,2,4-triazol-5-one (NTO) are two insensitive munitions compounds (IMCs) used to replace the conventional munitions TNT and RDX, respectively. Relatively little is known about how these IMCs will perform in the environment with respect to their biotransformation and retention in soil systems. The objective of Project ER-2221 was to evaluate the interaction of abiotic and biotic factors contributing to IMC attenuation in the soil, leading to the formation of environmentally safe end points. Anaerobic conditions were found to favor the biological and/or chemical reduction of the nitro groups, leading to the formation of amines intermediates. The amines retained toxicity; thus, further conversion was required. The amines formed from DNAN eventually became covalently incorporated into soil organic matter. The amine from NTO was mineralized by soil bacteria or manganese dioxide to carbon dioxide and inorganic nitrogen. https://www.serdp-estcp.org/content/download/46731/436800/file/ER-2221%20Final%20Report.pdf

PILOT-SCALE DEMONSTRATION OF PHYTOREMEDIATION OF PAH-CONTAMINATED SEDIMENTS BY *HYDRILLA VERTICILLATA* AND *VALLISNERIA SPIRALIS*
He, Y. and J. Chi.
Environmental Technology [published online 9 Nov 2017 prior to print]

Phytoremediation of PAH-contaminated sediments was investigated using two submerged aquatic plants (*Vallisneria spiralis* and *Hydrilla verticillata*) over a period of 108 days. The plants grew well, and more PAHs were removed from planted sediments than unplanted sediments. Final dissipation ratios of phenanthrene and pyrene were 85.9% and 79.1% in sediments planted with *V. spiralis* and 76.3% and 64.6% in sediments planted with *H. verticillata*, but only 64.8% and 55.8% in unplanted sediments. *V. spiralis* exhibited higher phytoremediation ability, which was significantly related to its root oxygenation. When the field results were compared with those previously obtained in the lab, the ratio of root weight to sediment weight showed a similar trend to PAH dissipation enhancement. Bioconcentration factors of PAHs in the two plants were larger in the field study than in the lab owing to a quicker increase of plant weight in the field.

USE OF IN-FIELD BIOREACTORS DEMONSTRATE GROUNDWATER FILTRATION INFLUENCES PLANKTONIC BACTERIAL COMMUNITY ASSEMBLY, BUT NOT BIOFILM COMPOSITION
Christensen, G.A., J.-W. Moon, A.M. Veach, J.J. Mosher, A.M. Wymore, J.D. van Nostrand, et al.
PLoS ONE 13(3):e0194663(2018)

The influence of exogenous microorganisms in groundwater planktonic and biofilm microbial communities was investigated using in-field bioreactors as part of DOE's Integrated Field Research Challenge. After an acclimation period with source groundwater, bioreactors received either filtered (0.22 μM filter) or unfiltered well groundwater in triplicate. Communities were tracked routinely for 23 d after filtration initiation. Results suggest that although planktonic communities were sensitive to groundwater filtration, bacterial biofilm communities were stable and resistant to filtration. Bioreactors are useful tools for addressing questions pertaining to microbial community assembly and succession. The data gained provide a first step in understanding how an extrinsic factor, such as a groundwater inoculation and flux of microbial colonizers, impacts how microbial communities assemble in environmental systems.
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0194663

EVALUATION OF STRATEGIES TO MINIMIZE ECOTOXIC SIDE-EFFECTS OF SORBENT-BASED SEDIMENT REMEDIATION
Han, Z., S.Abel, J. Akkanen, and D. Werner.
Journal of Chemical Technology and Biotechnology 92(8):1938-1942(2017)

Concerns about ecotoxic side effects of the most commonly used sorbent, activated carbon (AC), on sensitive sediment-dwelling organisms were investigated using *Lumbriculus variegates* and river sediment polluted with PAHs to evaluate sorbent alternatives and magnetic sorbent recovery as potential engineering strategies to mitigate ecotoxic side effects. Magnetic biochar was identified as an effective PAH sorbent with fewer ecotoxic side effects than magnetic AC. After 85.1-100% magnetic recovery of this biochar, no measurable ecotoxic side effects on *L. variegatus* were observed in the treated sediment. Results show that ecotoxic effects of magnetic AC can be alleviated through sorbent recovery. *This paper is* ***Open Access*** *at* https://onlinelibrary.wiley.com/doi/full/10.1002/jctb.5224.

ZERO-VALENT IRON PARTICLES FOR PCB DEGRADATION AND AN EVALUATION OF THEIR EFFECTS ON BACTERIA, PLANTS, AND SOIL ORGANISMS
Sevcu, A., Y.S. El-Temsah, J. Filip, E.J. Joner, K. Bobcikova, and M. Cernik.
Environmental Science and Pollution Research 24(26):21191-21202(2017)

Two types of nano-scale zero-valent iron—NZVI-B prepared by borohydride reduction and NZVI-T produced by thermal reduction of iron oxide nanoparticles in H2—and a micro-scale ZVI were compared for PCB degradation efficiency in water and soil. All the types of ZVI were highly efficient in degrading PCBs in water but had little degradation effect on PCBs in soil. Although contact with NZVI-B had a significant negative impact on exposed bacteria, plants, earthworms, and ostracods, treatment with NZVI-T showed no negative effect, likely due to surface passivation through controlled oxidation of the nanoparticles.

COMBINED CHEMICAL AND MICROBIOLOGICAL DEGRADATION OF TETRACHLOROETHENE DURING THE APPLICATION OF CARBO-IRON AT A CONTAMINATED FIELD SITE

Vogel, M., I. Nijenhuis, J. Lloyd, C. Boothman, M. Poeritz, and K. Mackenzie.
Science of the Total Environment 628-629:1027-1036(2018)

Following injection of Carbo-Iron® into an aquifer contaminated with PCE, combined chemical and microbiological contaminant degradation processes were found in a long-term study of the field site in Lower Saxony (Germany). Carbo-Iron consists of colloidal activated carbon and embedded nanoscale zero-valent iron (ZVI) structures designed to accumulate contaminants and promote their reductive dechlorination. The particles decreased the redox potential of the groundwater by their reaction with oxygen and by the ZVI-corrosion-induced formation of molecular hydrogen up to 190 d after injection, the latter promoting sulfate-reducing conditions. Overall, the moderate and slow change of environmental conditions mediated by Carbo-Iron not only supported organohalide-respiring bacteria but also created the basis for a subsequent microbial oxidation step.

CONTROLLED DEPOSITION OF PARTICLES IN POROUS MEDIA FOR EFFECTIVE AQUIFER NANOREMEDIATION

Bianco, C., J.E. Patino Higuita, T. Tosco, A. Tiraferri, and R. Sethi.
Scientific Reports 7:12992(2017)

A model-assisted strategy was developed to control the distribution of colloids in porous media in the framework of iron oxide-based aquifer nanoremediation, in this case by the delivery of humic acid-stabilized iron oxide nanoparticles (FeOx), a typical reagent for in situ immobilization of heavy metals. The treatment strategy comprises tuned sequential injections of FeOx suspensions and solutions containing a destabilizing agent (calcium or magnesium) to develop two fronts that advance at different rates and overlap at the target location of the porous systems. In the target area the particles deposit and accumulate irreversibly, creating a reactive zone. An analytical expression predicting the position of the clustering zone in a 1D system was derived from first principles of advective-dispersive transport. Through this equation, the sequence and duration of the injection of the different solutions in the medium can be assessed. Successful application of the model to various systems comprising the use of different sands or immobilizing cations in 1D and 2D geometries demonstrated its robustness. This method has the potential to make nanoremediation a more effective alternative to conventional techniques. https://www.nature.com/articles/s41598-017-13423-y.pdf?origin=ppub

TAKING NANOTECHNOLOGICAL REMEDIATION PROCESSES FROM LAB SCALE TO END USER APPLICATIONS FOR THE RESTORATION OF A CLEAN ENVIRONMENT: PROJECT FINAL REPORT

NanoRem: Nanotechnology for Contaminated Land Remediation, 162 pp, 2017

From January 2013 through January 2017 the NanoRem research project, funded through the European Commission FP7, focused on facilitating practical, safe, economic, and exploitable nanotechnology for in situ remediation. Technology development and transfer was undertaken in parallel with developing a comprehensive understanding of the environmental risk-benefit for the use of nanoparticles (NPs), market demand, overall sustainability, and stakeholder perceptions. The project introduced a variety of remediation NPs, which are described in this report. All the NPs were intensively tested and optimized with respect to mobility and reactivity in column experiments, and two—Carbo-Iron® and Nano-Goethite—were used in large-scale studies at different field sites. In the course of its NP studies, NanoRem also developed analytical methods and field measurement devices, numerical tools, and technical guidelines.
https://cordis.europa.eu/docs/results/309/309517/final1-final-report.pdf

PILOT-SCALE DECONTAMINATION OF SOIL POLLUTED WITH AS, CR, CU, PCP, AND PCDDF BY ATTRITION AND ALKALINE LEACHING

Metahni, S., L. Coudert, M. Chartier, J.-F. Blais, G. Mercier, and S. Besner.
Journal of Environmental Engineering 143(9):(2017)

The performance and the robustness of a decontamination process were evaluated for the treatment of four different contaminated soils by attrition and alkaline leaching (i.e., soil washing) at pilot scale. All the soils contained As, Cr, Cu, PCP, and PCDD/F. The attrition process first separated out the coarse particle fraction (>0.125 mm) from the different soils. Results of an additional three leaching steps conducted on the fine fraction (A pre-publication version of this paper is available at http://espace.inrs.ca/6351/1/P003153.pdf.

General News

DEVELOPING SEDIMENT REMEDIATION GOALS AT SUPERFUND SITES BASED ON PORE WATER FOR THE PROTECTION OF BENTHIC ORGANISMS FROM DIRECT TOXICITY TO NONIONIC ORGANIC CONTAMINANTS

Burkhard, L.P., D.R. Mount, and R.M. Burgess.
EPA 600-R-15-289, 75 pp, 2017

This document contains a methodology for developing and applying pore water remediation goals (RGs) for nonionic organic contaminants in sediments for the protection of benthic organisms. The text provides a technical approach and basis for setting the pore water RGs for contaminants in sediments. Contaminant concentrations in the sediment pore water measured using passive sampling directly incorporate bioavailability of the chemicals at the site into the development of site-specific sediment RGs. Also discussed is how to evaluate the consistency between passive sampling measurements and sediment toxicity testing results. When these data are consistent, there is reasonable assurance that the causes of toxicity to benthic organisms in the sediment have been correctly identified and that the developed pore water RGs for the contaminants will be protective of the site's benthic organisms.
https://semspub.epa.gov/work/HQ/100000539.pdf

MANUFACTURED GAS PLANT REMEDIATION: A CASE STUDY

Hatheway, A.W. and T.B. Speight.
CRC Press, Boca Raton, FL. eBook ISBN: 9781498796866, 1084 pp, 2017

The assessment, remediation, and redevelopment of manufactured gas plant (MGP) sites pose a significant technical and financial challenge to successor property owners, including municipalities and other public entities undertaking brownfields revitalization, and to their consulting environmental engineers. Due to the toxicity of many coal tar constituents, sites contaminated as a result of gasworks operations pose a significant threat to public health. The history of the manufactured gas industry in Massachusetts (the largest in the United States) is discussed, as well as the toxicity of gasworks waste products. The book then addresses the technical challenges in the MGP cleanup process, from site assessment, to remediation, to redevelopment. *See a brief **PDF preview** of the book at* https://www.taylorfrancis.com/books/9781498796866.

EXPOSURE FACTORS HANDBOOK, CHAPTER 5: SOIL AND DUST INGESTION 2017 UPDATE

U.S. EPA, National Center for Environmental Assessment, Washington, DC.
EPA 600-R-17-384F, 100 pp, 2017

This document is an update to Chapter 5 (Soil and Dust Ingestion) of the 2011 edition of the *Exposure Factors Handbook*. This update includes a comprehensive review of the scientific literature published since the development of the previous edition through 2016. New information has been added, and the recommended ingestion values have been revised as needed.
https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100TTX4.txt

T2-GEOPHYSICS: A TECHNOLOGY TRANSFER PROGRAM FOR FACILITATING EFFECTIVE USE OF GEOPHYSICS FOR ENVIRONMENTAL CHARACTERIZATION AND MONITORING AT DOD SITES
ESTCP Project ER-201567-T2, 2018

This project has two broad objectives: (1) to broaden effective deployment of geophysical technologies to achieve DoD's environmental performance goals and reduce costs and timelines to resolve environmental issues resulting from novel technology transfer (T2) on geophysical technologies, and (2) to develop effective T2 activities that overcome the limitations of standard ESTCP documents (reports, protocols, and guidance documents) and provide for more effective transfer of the key information needed on geophysical technology performance by managers and decision-makers. The project's approach to technology transfer combines training workshops, YouTube videos, webinars (archived and so still available), an "Ask the Geophysicist" forum, and an Excel-based tool to promote the effective use of electrical imaging methods. This novel approach capitalizes on web services for online dissemination of training products, along with social media for community-building. https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/ER-201567-T2

PFAS: PER- AND POLYFLUOROALKYL SUBSTANCES
Interstate Technology and Regulatory Council (ITRC) Website, 2018

ITRC is developing this series of fact sheets to summarize the latest science and emerging technologies for PFASs. ITRC has updated one of the three fact sheets produced in 2017—Naming Conventions and Physical and Chemical Properties—and has released three additional technical fact sheets on the following topics:

- Environmental Fate and Transport (18 pages).
- Site Characterization Considerations, Sampling Precautions, and Laboratory Analytical Methods (9 pages).
- Remediation Technologies and Methods (12 pages).

Translation of the fact sheets into Spanish is underway. Publication of a fact sheet on PFAS-containing aqueous film-forming foam used in firefighting is anticipated in August 2018. http://pfas-1.itrcweb.org/fact-sheets/

LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL) SITE MANAGEMENT: LCSM EVOLUTION, DECISION PROCESS, AND REMEDIAL TECHNOLOGIES
Interstate Technology and Regulatory Council (ITRC), LNAPL-3, 2018

This guide builds upon and supersedes the two previous ITRC LNAPL guidance documents in an updated, web-based format. LNAPL-3 is inclusive of materials from LNAPL-1 and LNAPL-2 with new topics presented and previous topics elaborated upon and further clarified. This guide can be used for any LNAPL site regardless of size. After the introduction the guide is organized in the following sections: (1) LNAPL Regulatory Context, Challenges, and Outreach; (2) Key LNAPL Concepts; (3) LNAPL Conceptual Site Model (LCSM); (4) LNAPL Concerns, Remedial Goals, Remediation Objectives, and Remedial Technology Groups; and (5) LNAPL Remedial Technology Selection, followed by five appendices. https://lnapl-3.itrcweb.org/

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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