Technology Innovation News Survey

Entries for October 1-15, 2016

Market/Commercialization Information

INDEFINITE DELIVERY ARCHITECT-ENGINEER SERVICES CONTRACT FOR HTRW, PRIMARILY VARIOUS LOCATIONS, ALASKA

U.S. Army Corps of Engineers, USACE District, Alaska.
Federal Business Opportunities, FBO-5460, Solicitations W911KB-17-R-0014 [Unrestricted] and W911KB-17-R-0015 [Small Business set-aside], 2016

The USACE HTRW program covers investigation, planning and design for cleanup of hazardous, toxic, and radiological wastes; debris; military munitions response; and other environmental contaminants at various locations in Alaska. The Alaska District invites submittal of SF330 qualifications statements from businesses both large and small under NAICS code 541330. Firms will be selected for negotiation based on demonstrated competence and qualifications for the required work. Under each solicitation, up to four indefinite-delivery, firm-fixed-price contracts will be awarded. Under Solicitation W911KB-17-R-0014, the contract limit will be $72M over five years shared amongst all awardees in the unrestricted MATOC pool. Under Solicitation W911KB-17-R-0015, the contract limit will be $48M over five years shared amongst all awardees in the Small Business MATOC pool. The first contract awards are anticipated for the 3rd quarter of FY 2017. Contracts are currently in place for like services. The selected A-E firms must have sufficient staff, flexibility, and capability to be available on an as-needed basis. Interested firms may submit SF330 packages by 2:00 PM Alaska time on December 2, 2016. Projects to be assigned are not yet determined and funds are not presently available.
W911KB-17-R-0014: https://www.fbo.gov/spg/USA/COE/DACA85/W911KB-17-R-0014/listing.html
W911KB-17-R-0015: https://www.fbo.gov/spg/USA/COE/DACA85/W911KB-17-R-0015/listing.html

COMPARATIVE TEST AND EVALUATION OF EXPEDITIONARY COTS AND NEAR-COTS SYSTEMS

Department of the Navy, Naval Sea Systems Command, NSWC IHEODTD, Indian Head, MD.
Federal Business Opportunities, FBO-5461, Solicitations N00174-17-S-0001 [Mass Spectrometry] and N0017417SN0007 [Colorimetric Detection], 2016

The Naval Surface Warfare Center (NSWC), Indian Head Explosive Ordnance Disposal Technology Division is seeking sources for comparative test and evaluation.

- Under Solicitation N00174-17-S-0001, NSWC is seeking sources of expeditionary mass spectrometry-based commercial-off-the-shelf (COTS) and near-COTS systems capable of detecting trace amounts of energetic materials. The system must be flexible and transportable (e.g.,
- Under Solicitation N0017417SN0007, NSWC is seeking sources for COTS and near-COTS colorimetric kits capable of detecting trace and bulk (

These notices solicit vendors' information that fully explains their existing systems technology features, capabilities, and performance. NSWC plans to select expeditionary mass spectrometry-based explosive detection systems and colorimetric explosive detection kits for separate comparative studies, followed by final reports that will be made available to government agencies, DoD services, and law enforcement organizations. All interested sources may respond with a technical summary of five or fewer pages.
N00174-17-S-0001: https://www.fbo.gov/spg/DON/NAVSEA/N00174/N00174-17-S-0001/listing.html
N0017417SN0007: https://www.fbo.gov/spg/DON/NAVSEA/N00174/N0017417SN0007/listing.html

ENVIRONMENTAL PLANNING, COMPLIANCE, AND REMEDIATION TECHNICAL SERVICES

Army Contracting Command, ACC - RSA (W9113M) - (SPS), Redstone Arsenal, AL.
Federal Business Opportunities, FBO-5465, Solicitation W9113M-17-R-0001, 2016

This presolicitation synopsis provides notice to industry of the Government's intent to release a formal solicitation for Environmental Planning, Compliance, and Remediation Technical Services (EPCARTS). This notice is not a request for proposals. The EPCARTS procurement will be a competitive 8(a) set-aside resulting in a single-award IDIQ contract under NAICS code 562910. The anticipated period of performance is a 5-year ordering period (3-year base and two one-year options). This acquisition is for services to support the world-wide full-spectrum life-cycle environmental mission of the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command and its space and missile defense customers, including but not limited to ensuring the timely delivery of services for environmental remediation, pollution prevention, and environmental planning, analyses, compliance, and NEPA support. The current anticipated release date of the RFP is November 22, 2016, with proposals due January 10, 2017. ** Note: A Draft RFP and other background information files are posted separately at https://www.fbo.gov/notices/823a95ce68cb2103b5b468b82351ea91. ** https://www.fbo.gov/notices/e132ca3da80bdf2255a01aaf9504ec93

MOAB URANIUM MILL TAILINGS REMEDIAL ACTION (UMTRA) TECHNICAL ASSISTANCE CONTRACT

Department of Energy, EM Consolidated Business Center, Cincinnati, OH.
Federal Business Opportunities, FBO-5461, Solicitation DE-SOL-0009670, 2016

U.S. DOE anticipates issuing a DRAFT RFP by or about December 21, 2016, to provide support for the Moab Uranium Mill Tailings Remedial Action (UMTRA) Technical Assistance Contract (TAC). The work will be performed at Moab and Crescent Junction, Utah; at Grand Junction, Colorado; and at the contractor's facilities. DOE intends to conduct a presolicitation conference and site tour for this procurement, tentatively scheduled for December 7, 2016. For details and updates, monitor the Moab UMTRA TAC Procurement website at https://www.emcbc.doe.gov/SEB/Moab/. Interested parties are encouraged to review the Draft RFP and provide suggestions, comments, questions, and changes in writing to the POC for consideration by DOE in developing the Final RFP. The Government anticipates a single-award IDIQ contract with an ordering period of five years. This procurement will be 100% set-aside for 8(a) small businesses under NAICS code 562910. The Draft and Final RFP will also be posted on Fedconnect at https://www.fedconnect.net/FedConnect/?doc=DE-SOL-0009670&agency=DOE [Note: It may be necessary to copy and paste the URL into your browser for direct access.].

Cleanup News

BIOINJECTION PERFORMANCE REVIEW FOR THE BUILDING 100 AREA AND 4.5 ACRE SITE AT THE PINELLAS COUNTY, FLORIDA, SITE

U.S. DOE, Office of Legacy Management, LMS/PIN/N02091, 31 pp, 2016

This document summarizes the performance since 2010 of bioinjection (i.e., biostimulation and bioaugmentation) activities on TCE, DCE, and VC contamination at the Building 100 Area and the 4.5 Acre site at the Pinellas County, Florida, site; discusses how best to optimize future injection events; and identifies the approach for the bioinjection event in 2016. VC now is the only contaminant that exceeds its MCL (10 µg/L onsite and 1 µg/L onsite) on the 4.5 Acre site and the Essentra property. Bioinjection of emulsified vegetable oil (EVO) and *Dehalococcoides mccartyi* (DHM) was conducted at the 4.5 Acre site in 2010 and 2013 to decrease contaminant concentrations to MCLs along the west and southwest property boundaries (to meet risk-based corrective action requirements) and to minimize the extent of the contaminant plume in the site interior. Bioinjection was conducted at the Building 100 Area in 3 phases from October 2014 through November 2015 to enhance contaminant biodegradation to stabilize or shrink the contaminant plumes. Review of the 4.5 Acre site data demonstrated that EVO and DHM injection resulted in significant concentration decreases at most wells, but full effectiveness was limited

by elevated sulfate concentrations and by lack of contact of the injected EVO and DHM with the contaminants. Results in the Building 100 Area also suggest that that insufficient injectant/contaminant contact is the main factor limiting biodegradation.
http://www.osti.gov/scitech/servlets/purl/1260595

EVO/BIOAUGMENTATION FOR TREATMENT OF TRICHLOROETHENE BY BIOBARRIER AND SOURCE INJECTION APPROACH

Fogas, C.A., M. Kozar, B. Bakrania, and E. Schleicher.
Tenth International Conference on Remediation of Chlorinated and Recalcitrant Compounds (Palm Springs, CA; May 2016). Battelle Memorial Institute, Columbus, OH. ISBN: 978-0-9964071-1-3, Presentation A-087, 2016

Enhanced in situ bioremediation (EISB) using emulsified vegetable oil (EVO) was selected to treat chlorinated VOCs (mainly TCE, >10 mg/L) in groundwater in a glacial till aquifer beneath an urban setting to remove the source and provide for monitored natural attenuation. The 900 ft long plume originates in an on-site source area in the upper portion of the aquifer and follows a downward gradient to the lower portion of the aquifer off site. A lens of more uniform clean sand occurs in the till at depth and represents a preferential flow pathway. The 100 ft thick impacted glacial till aquifer lies over a less impacted Triassic basin bedrock aquifer. Two microcosms and a pilot test demonstrated that addition of electron donor and bioaugmentation can achieve complete reductive dechlorination of TCE in the site's groundwater. EVO was selected given its longevity to provide a more passive approach in this difficult urban setting. Injection through permanent monitoring wells (installed by rotosonic drilling) was selected owing to the difficult drilling environment (tight till with gravel and cobbles). Treatment is focused in the upper aquifer in the source area (where residual DNAPL is present) and in the lower aquifer at off-site biobarriers to intercept the dissolved VOC plume. This poster presents the remedial approach, implementation process, interim findings, and next steps planned for EISB optimization. **Poster:**
http://www.obg.com/uploads/insights/Battelle-EVOBioaugmentation_Fogas.pdf

ACCELERATED REGULATORY CLOSURE BY IN SITU REMEDIATION FOR A 1,4-DIOXANE, CHLORINATED SOLVENT, AND PETROLEUM MIXED PLUME IN A CLAY AQUIFER

Poynor, S. and S. George.
RemTech 2016: Remediation Technologies Symposium, 12-14 October, Banff, 16 slides, 2016

Due diligence as part of a building lease termination revealed shallow groundwater and soil contamination from historic cleaning of hydraulic fluid spills and leaks associated with a central underground tank at the former Alteon Flight Training Center, DFW Airport, Texas. Releases of chlorinated solvents, solvent stabilizer 1,4-dioxane, and petroleum hydraulic oil created a commingled groundwater plume in a very low-permeable clay aquifer beneath the building. Hydraulic oil was present as separated phase and dissolved phase hydrocarbons. The chlorinated solvent and solvent stabilizer portion of the plume (dissolved phase only) extended downgradient beyond the building beneath an adjacent property. Enhanced, staged in situ chemical oxidation was selected as the preferred remedy. Pilot testing in the source area under the building confirmed the technical viability of the selected remedy for treating soil and separated phase and dissolved phase groundwater contaminants. Source area media (plume core) under the building were treated first and remedial goals were verified, followed by treating the outside dissolved-phase groundwater plume. A sequentially staged treatment train was specifically designed for different portions of the plume using site-specific data. The quiet and minimal footprint of this approach allowed for continued use of the surrounding property and cleanup completion and approval in less than 3 years.
http://www.esaa.org/wp-content/uploads/2016/10/16-Poyner.pdf

EPA FINALIZES CLEANUP PLAN FOR DEFUNCT E.C. ELECTROPLATING PLANT IN GARFIELD, N.J.

U.S. Environmental Protection Agency, News Release 16-084, 2016

At the Garfield Groundwater Contamination Superfund site, groundwater contaminated with hexavalent chromium [Cr(VI)] from the operations of a former electroplating plant seeped into area basements in the surrounding community. When Cr(VI)-contaminated groundwater evaporates, it can leave behind chromium crystals, which potentially can adhere to skin and be accidentally ingested. EPA has inspected over 500 homes in Garfield, remediated 14 basements, and has an ongoing program of basement assessment and remediation. Because the company that created the toxic problem is no longer in business, EPA will spend about $37 million in tax dollars from the Superfund program to deal with cleanup. The preferred cleanup alternative calls for in situ treatment of the remaining chromium contamination at the original source, in situ reduction of Cr(VI) in the overburden groundwater, and restrictions on groundwater use until the overburden groundwater is restored. The preferred alternative would also continue basement monitoring and mitigation until the overburden groundwater is restored, to prevent exposure to chromium that could enter basements with contaminated groundwater. View the Proposed Plan at https://semspub.epa.gov/src/document/02/396453 and the Record of Decision at https://semspub.epa.gov/src/document/02/377072.

Demonstrations / Feasibility Studies

RESULTS OF THE IN SITU REDUCTION PILOT TEST, GARFIELD GROUNDWATER CONTAMINATION SUPERFUND SITE, NEW JERSEY

U.S. Environmental Protection Agency, Region 2, 158 pp, 2015

An in situ reduction (ISR) pilot test was conducted at the Garfield site to obtain information regarding the practicability of (1) injecting reagents into the overburden using direct-push injections, (2) achievably reducing hexavalent chromium [Cr(VI)] in overburden groundwater, and (3) creating reducing zone barriers as a component of the full-scale remedy. Results of the ISR pilot will support development of full-scale remedy alternatives, allowing the feasibility study to be completed with a greater degree of certainty. Between June 23 and July 2, 2014, the pilot test was performed in two separate areas within the boundaries of the E.C. Electroplating (ECE) property, i.e., within the vicinity of the former chromic acid tank storage tank (source area) and on the downgradient side of the ECE property along Lincoln Place (barrier area). Injections were carried out at 40 locations between the two areas using direct-push drilling and, where possible, a top-down injection approach. A total of 28,701 gal of a reagent solution comprising emulsified vegetable oil (EVO), magnesium sulfate, and water was injected: 4,800 gal within the source area and 23,901 gal within the barrier area. Post-injection, five rounds of groundwater sampling at five monitoring wells were carried out over 7 months to monitor performance. Overall, the ISR pilot results demonstrated that EVO can be injected and distributed at concentrations sufficient to stimulate Cr(VI) reduction at the ECE property. https://semspub.epa.gov/src/document/02/376326

IN SITU BIOREMEDIATION PILOT TEST AT THE 500 RAMP AREA: DATA SUMMARY REPORT, FORMER BOEING WICHITA FACILITY, WICHITA, KANSAS

Kansas Department of Health and Environment (KDHE), 381 pp, 2015

The 500 Ramp Area is located in the northeast corner of the Former Boeing Wichita Facility beneath which the dissolved-phase TCE plume in the groundwater emanates from a source area centered near monitoring well MW-03-01R, which historically has exhibited concentrations of chlorinated ethenes >100,000 µg/L. A bioremediation pilot test program was initiated in December 2003, and total VOC concentrations within the treatment area decreased substantially by late 2007. Initially, the carbon amendments were injected monthly at most injections wells, but ongoing periodic injection events were limited to select injection wells as TVOC concentrations decreased within the treatment area. Following source excavation in 2010, carbon amendment injections were suspended to test for rebound in concentrations of chlorinated ethenes. TVOC concentrations increased at many source area wells between the 2011 and 2012 sampling events, indicating the persistence of residual mass in the area. Between July 2013 and April 2014, six lactate injection events were completed at each of six wells to address rebound. TVOC concentrations subsequently decreased at MW-03-01R (from 1,800 µg/L in July 2014 to 75.6 µg/L in September 2014) and in many surrounding wells. TVOC concentrations in the 500 Ramp Area have declined substantially since December 2003; however, monitoring results suggest that residual mass persists below the relatively shallow contamination source that historically has been the focus of in situ treatment. [Note: In 2016, the site contractor recommended expanding the bioremediation program.] *See this report and additional site cleanup information at*
http://kensas.kdhe.state.ks.us/berisl/getIdentifiedSiteListing.kdhe_ber?projectCode=C2-087-00015&siteName=BOEING%20WICHITA

APPROVAL REQUESTS: 1,4-DIOXANE PILOT TESTS, PLANTS 2 AND 3, INDUSTRIAL LAND, LANSING, MICHIGAN

Revitalizing Auto Communities Environmental Response (RACER) Trust, [2 reports] 2016

The RACER Trust contractor prepared work plans to provide information required to obtain Michigan Department of Environmental Quality (MDEQ) approval to perform field pilot studies to evaluate technology performance in treatment of 1,4-dioxane. MDEQ approved both work plans.
The 1,4-dioxane bioreactor pilot test is for a moving bed bioreactor (MBBR). Due to the daily volume of water necessary for culturing biomass for testing, a field pilot test is recommended over a bench test. The pilot objective is to evaluate the effectiveness of a directed groundwater recirculation system using an MBBR to treat 1,4-dioxane present in the weathered bedrock at Plants 2 and 3 (the lower 1,4-dioxane plume). Pilot results will be used to verify the effectiveness of the MBBR system compared to traditional ex situ treatment technologies and provide data for a potential full-scale MBBR system design.
https://p.enfos.com/publicDocs/33182/edccdf23-8cc9-4ff3-bf4f-314be06b4b92 *Followup: The MBBR pilot test is scheduled to run from September through November 2016.*
The 1,4-dioxane propane biosparge pilot test is an application of enhanced in situ cometabolic biodegradation. Propane biosparging relies on the ability of propane-oxidizing bacteria to degrade 1,4-dioxane while using propane as a primary source of food and energy. The propane and oxygen are used to proliferate seeded propanotrophs, but the propane will be limited such that 1,4-dioxane is consumed as a secondary carbon source. Oxygen will be provided in excess to ensure sufficient electron acceptors. Results of this field pilot will help to determine whether the technology can be implemented cost-effectively as a remedy for the lower 1,4-dioxane plume.
https://p.enfos.com/publicDocs/33182/4a7962f4-3050-4736-9459-d5b1e1f30c5c *Followup: Phase I of the lower 1,4-dioxane biosparge pilot test was completed June 16-17 at Plant 2, with Phase II following in September 2016. See slides on the proposed application of both technologies at* https://p.enfos.com/publicDocs/33182/023486d5-4b72-45ba-9c53-42b87ca3ff63.

A COMPACT REMEDIATION SYSTEM FOR THE TREATMENT OF GROUNDWATER CONTAMINATED WITH BTEX AND TPH

Caetano, M.O., I.A.H. Schneider, L.P. Gomes, A.G. Kieling, and L.A.S. Miranda.
Environmental Technology 1-13(2016) [published online prior to print]

A compact pilot system was developed to treat groundwater contaminated with BTEX and total petroleum hydrocarbons (TPH) leaked from gas station tanks. The system comprised three units: (1) suction and volatilization of VOCs, (2) aeration tank (to remove VOCs), and (3) an adsorption packed-bed filter (50% each activated carbon and rice husk ash to remove TPH). Levels of BTEX and of TPH declined 96% after 8 hours retention. This efficient remediation system yielded water that met the discharge standards defined in Brazilian legislation, i.e., maximum benzene, toluene, and xylene levels of 5, 170, and 300 µg/L, respectively.

Research

DEVELOPMENT OF A NEW SUSTAINABLE THERMAL REMEDIATION AND RECOVERY TECHNOLOGY USING LOW ENERGY RAPID EXOTHERMAL REACTION TECHNIQUE

Min, B.J., J. Waddell, and S. Park.
RemTech 2016: Remediation Technologies Symposium, 12-14 October, Banff, 20 slides, 2016

The fundamental kinetics of a novel heat-enhanced remediation technology involves proprietary enhancement amendments and concentrated low-energy heating techniques. The process is effective to remediate hydrocarbons and/or organic contaminants from surface or subsurface soils by cracking, mass extraction, and enhanced volatilization and recovery of volatile and semi-volatile contaminants. This new sustainable approach decreases hydrocarbon viscosity, generates pressure, and cracks long hydrocarbon chains. Gases released from these reactions also enlarge soil pores, thereby increasing hydrocarbon mobility for removal. This technique can be applied both in situ and ex situ and allows product recovery for reuse or recycle. The fundamental mechanisms of this technology can also be applied to address dissolved contaminants and NAPL. To date, bench-scale and lab prototype tests have been completed along with registrations of patent applications. Field pilot studies are underway. The presentation of test results includes technology performance for different types of soils and organic contaminants.
Slides: http://www.esaa.org/wp-content/uploads/2016/10/16-Waddell.pdf

LONG TERM FIELD STUDY OF MICROBIAL COMMUNITY AND DECHLORINATING ACTIVITY FOLLOWING CARBOXYMETHYL CELLULOSE-STABILIZED NANOSCALE ZERO VALENT IRON INJECTION

Kocur, C.M.D., L. Lomheim, O. Molenda, K.P. Weber, L.M. Austrins, B.E. Sleep, H.K. Boparai, E.A. Edwards, and D.M. O'Carroll.
Environmental Science & Technology 50(14):7658-7670(2016)

The microbial community composition at a contaminated site was monitored for two years following the injection of nanoscale zero-valent iron stabilized with carboxymethyl cellulose (NZVI-CMC). Enhanced dechlorination of chlorinated ethenes to nontoxic ethene was observed long after the expected NZVI oxidation. The abundance of *Dehalococcoides* (Dhc) and VC reductase genes, monitored using qPCR, increased by over an order of magnitude in NZVI-CMC-impacted wells. The entire microbial community was tracked using 16S rRNA gene amplicon pyrosequencing. Following NZVI-CMC injection, a clear shift in the microbial community was observed, with most notable increases in the dechlorinating genera *Dehalococcoides* and *Dehalogenimonas*. Results suggest that coupled abiotic degradation (i.e., from reaction with NZVI) and biotic degradation fueled by CMC led to long-term degradation of chlorinated ethenes at this field site. Furthermore, NZVI-CMC addition stimulated dehalogenator growth (e.g., Dhc) and biotic degradation of chlorinated ethenes.

NETWORK SUCCESSION REVEALS THE IMPORTANCE OF COMPETITION IN RESPONSE TO EMULSIFIED VEGETABLE OIL AMENDMENT FOR URANIUM BIOREMEDIATION

Deng, Y., P. Zhang, Y. Qin, Q. Tu, Y. Yang, Z. He, C.W. Schadt, and J. Zhou.
Environmental Microbiology 18(1):205-218(2016)

Investigators modified the random matrix theory-based network approach to discern network succession in groundwater microbial communities in response to emulsified vegetable oil (EVO) amendment for uranium bioremediation. Groundwater microbial communities from one control and seven monitor wells were analyzed with a functional gene array (GeoChip 3.0) to enable reconstruction of functional molecular ecological networks (fMENs) at different time points. Results showed that EVO amendment dramatically altered network interactions. Dynamic and resilient succession was evident: fairly simple at the initial stage (Day 0), increasingly complex at the middle period (Days 4, 17, 31), most complex at Day 80, and then decreasingly complex at later stages (140-269 days). Unlike previous studies in other habitats, negative interactions predominated in time-series fMEN, suggesting strong competition among different microbial species in the groundwater systems after EVO injection. Several keystone sulfate-reducing bacteria showed strong negative interactions with their network neighbors. These results provide mechanistic understanding of the decreased phylogenetic diversity during environmental perturbations. *This paper is* ***Open Access*** *at* http://onlinelibrary.wiley.com/doi/10.1111/1462-2920.12981/pdf.

CARBONACEOUS NANO-ADDITIVES AUGMENT MICROWAVE-ENABLED THERMAL REMEDIATION OF SOILS CONTAINING PETROLEUM HYDROCARBONS

Apul, O.G., A.G. Delgado, J. Kidd, F. Alam, P. Dahlena, and P. Westerhoff.
Environmental Science: Nano [2016, Advance Article]

Researchers evaluated microwave irradiation in the presence of nano- and macro-scale graphitic additives as a rapid remediation technology for removing heavy hydrocarbons from soil. Adding inert materials (i.e., glass wool fibers or washed silica sand) as controls had no effect on total petroleum hydrocarbons (TPH) removal upon microwave irradiation, whereas adding carbonaceous nanomaterials (i.e., carbon nanotubes, graphene nanosheets, and carbon nanofibers) showed extraordinary heating performances when mixed with soil and microwave irradiated. Adding the carbonaceous nanomaterials to contaminated soils removed more TPH compared with macro-scale carbonaceous additives. TPH concentrations decreased from 11,000 to between 2000-6000 mg TPH/kg soil within one minute using

carbon nanomaterial additives and a 2.45-GHz, 1000-W conventional microwave oven. In separate experiments, this technology decreased TPH from 2500 to 650 mg TPH/kg soil from soils containing recalcitrant, non-biodegradable fractions of TPH.

PHYTOREMEDIATION OF IMPACTED SOIL: FIELD RESEARCH TRIALS WITH NEW APPLICATIONS, SPECIES AND CHALLENGES

Murray, E.W., B. Greenberg, B. Poltorak, K. Cryer, and P. Gerwing.
RemTech 2016: Remediation Technologies Symposium, 12-14 October, Banff, 44 slides, 2016

Advanced phytoremediation systems are being developed for cost-effective removal of petroleum hydrocarbons (PHCs), PAHs, and salt from soils. Plant growth-promoting rhizobacteria (PGPR)-enhanced phytoremediation systems, or PEPS, create abundant root biomass in impacted soils, stimulate exponential growth of rhizobacteria that facilitate partitioning of contaminants out of the soil, degrade PHCs, and sequester salt into plant foliage. Soil remediation is usually complete within 3 years of treatment on PHC sites and longer term on salt sites. PEPS have been successfully deployed for 10 years on many sites located across seven Canadian Provinces/Territories to remediate PHC and salt impacts in soil. PEPS provide significant cost savings in remote/northern areas, where harsh conditions/permafrost persist, distances are significant, and access to landfill is difficult or nonexistent. Field trials are underway to expand PEPS applications. This presentation describes field results obtained from conventional PHC sites located in northern Alberta, enhanced reclamation studies involving marginal soils and grasslands in central Alberta, preliminary data from PEPS application at a produced water spill within a wetland setting, and the use of hydro-seeding for deployment of PEPS on disturbed sites.
Slides: http://www.esaa.org/wp-content/uploads/2016/10/16-Murray.pdf

SELECTIVITY OF NANO ZEROVALENT IRON IN IN SITU CHEMICAL REDUCTION: CHALLENGES AND IMPROVEMENTS

Fan, D., D.M. O'Carroll, D.W. Elliott, Z. Xiong, P.G. Tratnyek, R.L. Johnson, and A. Nunez Garcia.
Remediation Journal 26(4):27-40(2016)

To date, the overall number of well-characterized field deployments of nanoscale zero-valent iron (NZVI) is still small compared to more widely applied remedies. Apart from the relatively high material cost of NZVI and questions regarding possible nanotoxicological side effects, a major obstacle to the widespread utilization of NZVI in the field is its short persistence in the environment due to natural reductant demand (NRD). The NRD for NZVI mainly is due to reduction of water, but other reactions with naturally present oxidants (e.g., oxygen) occur, resulting in in situ conditions that are reducing (high in ferrous iron phases and H_2) but with little or no elemental iron. This article reviews the main biogeochemical processes that determine the selectivity and longevity of NZVI, summarizes data from prior lab and field studies on the longevity of various common types of NZVI, and describes modifications that could improve NZVI selectivity and longevity for full-scale applications of in situ chemical reduction.

EVALUATION OF VAPOR INTRUSION PATHWAY ASSESSMENT THROUGH LONG-TERM MONITORING STUDIES

Holton, Chase Weston, Ph.D. dissertation, Arizona State University, 349 pp, 2015

A long-term, high-frequency indoor air data set was collected at a house overlying a dilute TCE groundwater plume. The project included periodic synoptic snapshots of groundwater and soil gas data and high-frequency monitoring of building conditions and environmental factors. Indoor air TCE concentrations varied over three orders of magnitude under natural conditions, with the highest daily vapor intrusion (VI) activity during fall, winter, and spring months. Simulation of outcomes from common sampling strategies indicated a high probability (up to 100%) of false-negative decisions and poor characterization of long-term exposure. A long-term controlled pressure method (CPM) test was conducted to assess its utility as an alternate approach for VI pathway assessment. Indoor air concentrations were similar to maximum concentrations under natural conditions (9.3 µg/m^3 average versus 13 µg/m^3 for 24 h TCE data) with little temporal variability. A key outcome was the absence of false-negative results. Results suggest that CPM tests can produce worst-case exposure conditions at any time of the year. https://repository.asu.edu/attachments/150778/content/Holton_asu_0010E_15040.pdf

VAPOR INTRUSION MONITORING METHOD COST COMPARISONS: AUTOMATED CONTINUOUS ANALYTICAL VERSUS DISCRETE TIME-INTEGRATED PASSIVE APPROACHES

Kram, M.L., B. Hartman, and C. Frescura. Remediation Journal 26(4):41-52(2016)

A series of common vapor intrusion monitoring scenarios and associated assumptions were derived to evaluate and compare costs of automated methods versus discrete time-integrated methods. Results suggest that for relatively larger sites where five or more locations will be monitored (e.g., large buildings, multistructure industrial complexes, educational facilities, or shallow groundwater plumes with significant spatial footprints under residential neighborhoods), procurement of continuous monitoring services is often less expensive than implementation of discrete time-integrated monitoring services. For instance, for a 1-week monitoring campaign, costs per analysis for continuous monitoring ranged from ~1 to 3% of discrete time-integrated method costs for the scenarios investigated. Over this same one-week duration, for discrete time-integrated options, the number of sample analyses equals the number of data collection points (which ranged from 5 to 30 for this effort). In contrast, the number of analyses per week for the continuous monitoring option equals 672, or four analyses per hour. Results also suggest that continuous automated monitoring can be cost-effective for multiple one-week campaigns on a quarterly or semi-annual basis in lieu of discrete time-integrated monitoring options.

REMEDIATION OF PCB-CONTAMINATED SOIL USING EXTRACTION AND DESTRUCTION: BENCH-SCALE TEST

Aluani, S., M.C.F. Spilborghs, and R.H.H. Kim. Remediation Journal 26(4):117-125(2016)

Researchers evaluated the effectiveness of extracting the PCB Aroclor 1260 from soil sampled from a former electrical plant area, transferring it to a liquid matrix, and then treating the PCB-containing liquid at bench scale using an Activated Metal Treatment System (AMTS). Based on zero-valent magnesium (ZVMg), AMTS is a technology developed by NASA. The initial concentration of untreated soil contained an average of 4.7 ± 0.15 mg/kg of Aroclor 1260. Results showed that mass transfer is possible using ethanol as a liquid matrix, reaching transfer results up to 93%. The ZVMg enabled the destruction of the Aroclor 1260, which reached 20% without any buildup of undesirable by-products, such as less chlorinated PCBs.

MEASUREMENT OF PCB EMISSIONS FROM BUILDING SURFACES USING A NOVEL PORTABLE EMISSION TEST CELL

Lyng, N., L.B. Gunnarsen, H.V. Andersen, V. Koefoed-Sorensen, and P.A. Clausen.
Building and Environment 101:77-84(2016)

A low-cost emission test cell was developed and proved capable of providing a micro environment where source potentials of individual surface areas (up to 0.15 m^2) could be characterized. Sorption on cell surfaces did not affect measurements after 2-4 days; hence emission rates could be determined within a few days. PCB emission rates were different depending on the surface type, even for different surfaces within the same room. The emission test cell can be used to prioritize future or evaluate completed remediation measures of contaminated surfaces. *For additional information on the test cell, which was developed during N. Lyng's study of PCB-contaminated buildings, see her dissertation at* http://vbn.aau.dk/files/238715098/PHD_Nadja_Lyng_E_pdf.pdf.

General News

SOIL DIOXIN RELATIVE BIOAVAILABILITY ASSAY EVALUATION FRAMEWORK

U.S. Environmental Protection Agency, OSWER 9200.2-136, 16 pp, 2015

Until standard procedures for estimating the relative bioavailability (RBA) of PCDD/F in soil are established, there is a need for a consistent approach to evaluate the strengths and weaknesses of assays designs proposed or implemented to support risk assessments.

This report offers a framework for making such evaluations. Specific design parameters that should be subject to evaluation are identified and relevant scientific literature is cited where more in-depth discussion can be found. Whenever possible, minimal requirements for study designs are proposed. This report also identifies issues that have yet to be resolved regarding how RBA assays should be designed and which could be objectives of further research to develop RBA assays for soil PCDD/F and applications to risk assessment. http://semspub.epa.gov/src/document/HQ/175334

STATE VAPOR INTRUSION GUIDANCE UPDATES

- The Kansas Dept. of Health and Environment updated its 2007 VI guide with *Kansas Vapor Intrusion Guidance* (25 pp, 2016). http://www.kdheks.gov/remedial/vapor_intrusion.html
- The Ohio EPA supplemented its 2010 guidance (http://epa.ohio.gov/portals/28/Documents/TGM-15.pdf) with *Recommendations Regarding Response Action Levels and Timeframes for Common Contaminants of Concern at Vapor Intrusion Sites in Ohio* (10 pp, 2016). http://www.ohioenvironmentallawblog.com/uploads/file/Response%20Action%20Levels%20for%20VOC%20Final08_24_2016.pdf
- The Massachusetts Office of Energy and Environmental Affairs replaced its 2010 draft VI guide with *Vapor Intrusion Guidance: Site Assessment, Mitigation and Closure* (Policy #WSC-16-435, 190 pp, 2016). http://www.mass.gov/eea/agencies/massdep/cleanup/regulations/site-cleanup-policies-guidance.html
- The Minnesota Pollution Control Agency issued a variety of new multi-part resources, including intrusion screening values and best management practices for VI investigation, mitigation, and public communication. https://www.pca.state.mn.us/waste/vapor-intrusion
- The New Jersey Department of Environmental Protection introduced Version 4 of its *Vapor Intrusion Technical Guidance* (178 pp, 2016). http://www.nj.gov/dep/srp/guidance/vaporintrusion/
- The North Carolina Dept. of Waste Management supplemented its 2014 *Vapor Intrusion Guidance* (https://deq.nc.gov/about/divisions/waste-management/waste-management-permit-guidance/dwm-vapor-intrusion-guidance) with separate tables for Residential and Non-Residential Vapor Intrusion Screening Levels (2016).
- The Washington Dept. of Ecology updated tables in its 2009 VI guidance and added Implementation Memorandum #14: *Updated Process for Initially Assessing the Potential for Petroleum Vapor Intrusion* (15 pp, 2016). http://www.ecy.wa.gov/programs/tcp/policies/VaporIntrusion/vig.html

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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