Technology Innovation News Survey

Entries for January 16-31, 2019

Market/Commercialization Information

ERAS ANALYTICAL ECONOMIC SUPPORT

U.S. Environmental Protection Agency, Office of Acquisition Solutions, Washington, DC.
Federal Business Opportunities, Solicitation 68HERH19R0004, 2019

The results of this market research will contribute to determining the method of procurement for EPA's requirement for analytical economic support for the economics and risk analysis staff (ERAS) in the Office of Land & Emergency Management, Office of Resource Conservation and Recovery (ORCR). The resultant contract would support ORCR and its mission to encourage land-based practices that help ensure economic and environmental sustainability, safe materials/waste management, and ongoing waste reduction in accordance with the Performance Work Statement, which is available only on FedConnect. The scope of work for this contract is extensive and includes a wide variety of tasks that require multidisciplinary and highly specialized expertise. The NAICS code currently is 541620 (Environmental Consulting Services), size standard $15M. Responses to this notice will be used to determine whether this requirement might be most effectively procured as a set-aside, multiple awards, or full and open competition. Responses must be submitted through FedConnect by 4:30 PM ET on March 13, 2019.
https://www.fbo.gov/spg/EPA/OAM/HQ/68HERH19R0004/listing.html

REQUEST FOR APPLICATION: ADDRESSING ENVIRONMENTAL CONCERNS IN VIEQUES, PUERTO RICO THROUGH COMMUNITY PARTICIPATORY RESEARCH

U.S. Environmental Protection Agency, Funding Opportunity EPA-G2019-ORD-A1, 2019

For over 60 years, the small island of Vieques was used as a bombing range and site for military-training exercises. Unexploded ordnance and exploded remnants have been identified in the Vieques range areas and surrounding waters, where potential contaminants include mercury, lead, copper, magnesium, lithium, perchlorate, TNT, napalm, depleted uranium, PFASs, PCBs, solvents, and pesticides. Previous studies do not offer a clear picture of the extent of the environmental impacts; hence, insufficient information is available to determine the exposure status at the Vieques Superfund Site and assess risks. To foster a better understanding of environmental contamination, impact, and mitigation options at the Vieques site, EPA seeks applications to develop a community participatory research program to address the following specific research areas: (1) approaches and methods to detect and characterize the baseline level of contamination, (2) human health and ecosystem impacts caused by contaminant exposure, and (3) innovative approaches to mitigate site contamination and enhance remediation. This RFA solicits research to facilitate the effective testing, evaluation, quantification and mitigation of the toxic substances in the soil, seas, plant, animal, and human population of Vieques. The opportunity is open until April 23, 2019. EPA anticipates a single award out of an estimated $800,000 in total program funding.
Grants.gov: https://www.grants.gov/web/grants/view-opportunity.html?oppId=313134.
How to apply: https://www.epa.gov/research-grants/addressing-environmental-concerns-vieques-puerto-rico-through-community.

REFURBISHMENT OF ABOVEGROUND ENGINEERED TANK

Department of Energy, Navarro Research and Engineering Inc., North Las Vegas, NV.
Federal Business Opportunities, Solicitation LMCP6748, 2019

This notice constitutes market research and serves only as a method of establishing technical capabilities and commercial interest by companies interested in refurbishing an aboveground engineered tank, part of the Fernald Preserve Ohio Site Converted Advanced Wastewater Treatment (CAWWT) system. Qualified candidates may be invited to participate in a follow-on request for technical and business proposal. The CAWWT has successfully treated uranium-contaminated groundwater and other site wastewater at the Fernald site using mixed media filtration and U-specific ion exchange unit operations. Refurbishment of the aboveground engineered tank will encompass (1) characterizing basin sediments/material; (2) removing ~320 ÿdof presumed low-level radiological basin waste consisting of sediments with vegetation, plus removal and disposal of the liner; (3) managing ~1 ft of basin water, which will be placed back into the new basin; (4) processing, packaging, and shipping waste that meets the Waste Acceptance Criteria at either the Energy Solutions (Clive, UT) or Waste Control Specialists (Andrews, TX) disposal facilities; (5) providing regraded base; (6) installing new liner; (7) installing a bubbler aeration system; and (8) installing a floating basin cover made of engineered balls. Expressions of interest and questions must be received by March 15, 2019. Release of the RFP is anticipated on or about March 25, 2019. https://www.fbo.gov/spg/DOE/SNJV/NNSANV/LMCP6748/listing.html

FOX RIVER NRDA

Department of the Interior, Fish and Wildlife Service, Funding Opportunity F19AS00032, 2018

The Fox River Green Bay Natural Resource Trustees restore natural resources injured by the release of PCBs into the Lower Fox River and Green Bay, WI. These restoration projects fulfill the natural resource objectives of the 2003 Joint Restoration Plan and Environmental Assessment for the Lower Fox River and Green Bay Area and the 2016 Restoration Plan Update under CERCLA authority. This opportunity is not a conventional grants program: Eligible entities interested in applying for funds from the NRDA Program are requested to contact the Restoration Coordinator for submission instructions and timeline. Applications are due by 5:00 PM ET on September 30, 2019. About 15 awards are expected out of estimated funding of $3M. See more at http://www.grants.gov/web/grants/view-opportunity.html?oppId=310154.

ENVIRONMENTAL SERVICES AND REMEDIAL ACTION OPERATIONS FOR BRAC LEGACY SITES: FORMER FORT DEVENS, DEVENS, MASSACHUSETTS

Department of the Army, U.S. Army Corps of Engineers, USACE District, New England.
Federal Business Opportunities, Solicitation W912WJ19R0003, 2019

The U.S. Army Corps of Engineers, New England District is soliciting proposals for an Environmental Services Contract at the former Fort Devens and the former Sudbury Training Annex on behalf of the Army under the BRAC Program. The contract will be an IDIQ single-award task-order contract (SATOC) competitive 8(a) acquisition under NAICS code 562910, size standard 750 employees. The total acquisition value of the contract awarded under this solicitation will have a capacity of $20M over a 5-year ordering period with no option years. Proposals are due by 1:00 PM ET on March 28, 2019. https://www.fbo.gov/spg/USA/COE/DACA33/W912WJ19R0003/listing.html

Cleanup News

LONG-TERM STEWARDSHIP OF THREE EVAPOTRANSPIRATIVE COVERS: 15 YEARS

Collins, S., M.M. Mitchell, and R. Ziock.
2018 Long-Term Stewardship Conference, August 20-23, Grand Junction, Colorado. 17 slides, 2018

Summer 2018 marked the 15th anniversary of effective, compliant evapotranspiration (ET) landfill cover performance at Sandia National Laboratories (SNL). From 2003 to 2009, SNL constructed three ET covers ranging from 2.2 to 4.1 acres in Sandia's Technical Area 3 on Kirtland AFB, south of Albuquerque, New Mexico. The evaporation potential is optimal in Albuquerque due to low humidity and generally warm temperatures. The average annual precipitation in this area is 8.72 inches, with half of that accumulation occurring from intense, brief thunderstorms during the months of June through August. New Mexico Environment Department (NMED) post-closure care, long-term monitoring, and maintenance requirements call for quarterly cover inspections, any follow-on maintenance within 60 days, and annual reporting. All three SNL ET Covers meet successful revegetation permit requirements. NMED has approved all SNL annual reports. To facilitate exchange of lessons learned between cover projects, a single SNL team performs all three covers inspections. Likewise, maintenance activities are grouped under a single task order contract. All maintenance work is verified by a biologist and project lead. This presentation notes best practices and lessons learned from SNL's 15 years of experience with ET cover construction, preventive care, and maintenance. https://www.energy.gov/sites/prod/files/2018/10/f56/Collins-Long-Term-Stewardship-Three-Covers.pdf

MEMORANDUM: CONTINGENT REMEDY EVALUATION [FOR GENERAL ELECTRIC SOUTH DAWSON ST.]

Washington State Department of Ecology, 15 pp, 2018

Environmental contamination at the former General Electric Aviation Div. facility (220 S. Dawson St., Seattle) will be cleaned up under RCRA and as part of Washington Ecology's source control strategy to control sources of pollution to the Duwamish River. PCE, TCE, 1,1,1-TCA, fuels, and oils affect soil and groundwater beneath the 220 South Dawson Street building, and their vapors affect the indoor air. Pump and treat is ongoing at the site. GE also conducted injections of aqueous persulfate into the contaminated groundwater below the property in March 2017 and installed persulfate slow-diffusion release bags into several groundwater wells on the property in October 2017, but these in situ chemical oxidation remedial alternatives were insufficiently effective in reducing groundwater contaminant concentrations. This memorandum presents a comparison of alternative treatment technologies and recommends in situ chemical reduction using EHC®—a solid material composed of a plant-based carbon source and zero-valent iron—to remediate the residual COCs associated with the site's shallow soil and groundwater impacts. Under Ecology oversight, GE will implement the recommended remedy. *See the memorandum at* https://fortress.wa.gov/ecy/gsp/DocViewer.ashx?did=75732 *and additional information on this site at* https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=2446.

Demonstrations / Feasibility Studies

DEMONSTRATION OF NEW TOOLS FOR IMPROVED SOURCE AND RECONTAMINATION POTENTIAL ASSESSMENT

Chadwick, B. and M. Arias-Thode.
ESTCP Project ER-201432, 2355 pp, 2017

A family of technologies adapted from the oceanographic and environmental arenas was combined to improve DoD's ability to address sediment contaminant source exposure, transport, and fate challenges at coastal sites in a relatively simple and cost-effective way. The demonstration focused on the following three key technologies: (1) Drifting Exposure System - a surface global positioning system (GPS) drifter with position data telemetry, composite sample collection, and passive sampler capabilities for exposure characterization. (2) Drifting Particle Simulator - a GPS drifter with position data telemetry, buoyancy control, bottom detection, and passive sampling capability for measurement of depositional footprints and sampling of source related particles. (3) Sediment Deposition Detector - a sediment bed scour sensor with high resolution differential pressure sensor, shore cable or in situ data logging, and coupled sediment trap capabilities. Field demonstrations were conducted at Naval Base San Diego (Paleta Creek) and Joint Base Pearl Harbor Hickam (Oscar Pier and Waiau Power Plant Area).
https://www.serdp-estcp.org/content/download/47129/449571/file/ER-201432%20Final%20Report.pdf *See also the 2018* ***ESTCP Cost and Performance Report*** *at* https://www.serdp-estcp.org/content/download/48247/459182/file/ER-201432%20Cost%20&%20Performance%20Report.pdf.

NEW PROCESS FOR THE TREATMENT OF PERCHLORATE CONTAMINATED WATER

Devic-Bassaget, B. and J.-Y. Richard.
NORDROCS 2018: 7th Joint Nordic Meeting on Remediation of Contaminated Sites: Poster.

A new biofiltration process has been developed for treating perchlorate-contaminated groundwater. The extensive biofilter comprises a thin granular bed completely saturated with water. The contribution of a carbon source in the effluent and the presence of organic matter in the upper layer of the biofilter allow passage and maintenance in an anoxic condition, which is favorable for the desired biodegradation. A deep layer supports the purifying biomass. Initial lab tests validated the system's feasibility and main operating parameters. A semi-industrial pilot (10 m x 10 m) was carried out on site to test the hydraulics of the system and the efficiency of the reed declogging device. A first industrial application was conducted to treat heavily impacted groundwater from a source containing ammonium perchlorate. The biofilter achieved perchlorate biodegradation up to 15 kg/d. Under optimal conditions, the system yielded residual perchlorate concentrations of a few µg/L (ppb) from input at >100 mg/L.

THE SUITABILITY OF SHORT ROTATION FORESTRY FOR PHYTOREMEDIATION OF URBAN SOIL: DEVELOPMENT OF A PROTOCOL FOR URBAN AREAS

Padoan, E.
REMEDIATE International Conference, 19-20 Sep 2018, Queen's University, Belfast. p 37, 2018

Field work was conducted to verify the effectiveness of phytoremediation on a former industrial Zn-contaminated soil within the city of Torino, Italy. The aims were to verify the suitability of applying phytoremediation in urban settings; assess the viability of short rotation forestry for soil remediation; determine the heavy metal uptake of different plant species; and establish an operational protocol for planting and agronomic maintenance of the parcels. Nine different tree types adapted to the Piedmont area with rapid growth and large biomass production were selected for parallel field and greenhouse experiments where plants were grown for two years. In the field experiment, short rotation forestry was adopted with a plant density of 10,000 plants per hectare. Biomass growth and soil were monitored throughout the trial to compare plant response and metal uptake rates in all plant tissues (roots, stems, leaves). In the urban contaminated soil, *Salix* was the best Zn accumulator, with maximum uptake in stem and leaves, although the produced biomass was low. After two years, no change in total soil metal content was observed, while bioavailable fractions of Zn and Cu declined significantly using all species, from the 26% of *Robinia* to the 36% decrease with *Salix*. In the pedoclimatic conditions of the urban site, *Robinia* was the most productive species, leading to higher extraction rate per hectare and giving promising results also in pot experiments, suggesting the possibility of increasing plant density to 16,000 plants per hectare.

THE IN SITU PILOT-SCALE PHYTOREMEDIATION OF AIRBORNE VOCS AND PARTICULATE MATTER WITH AN ACTIVE GREEN WALL

Pettit, T., P.J. Irga, and F.R. Torpy.
Air Quality, Atmosphere & Health 12(1):33-44(2019)

This work used pilot-scale trials to test the capacity of potted plants, a passive green wall, and an active green wall (AGW) to remove particulate matter (PM) and total VOCs (TVOCs) from a room in a suburban residential house, followed by an assessment of the AGW's potential to remove these pollutants from a classroom. In the residential room, the AGW maintained TVOCs at significantly lower concentrations compared to potted plants and the passive green wall throughout the experimental period (average TVOC concentration 72.5% lower than the control), with a similar trend observed for PM. In the classroom, the AGW reduced the average TVOC concentration by ~28% over a 20-min testing period compared to levels with no green wall and a filtered HVAC system in operation. The average ambient PM concentration in the classroom with the HVAC system operating was 101.18 $\mu g/m^3$ which was reduced by 42.6% by the AGW. With further empirical validation, AGWs might be installed to clean indoor air through functional reductions in PM and TVOC concentrations.

DPT JET INJECTION FOR REMEDIATION IN CLAY TILL: FULL-SCALE CASE STUDY RESULTS FROM OVER 3 YEARS OF TREATMENT

Ross, C. and D. Eberle.
RemTech 2018, 10-12 October, Banff, Alberta, Canada. 57 slides, 2018

A former industrial facility in Niva, Denmark, was affected by chlorinated VOCs in clay till over ~750 m^2 and 6-12 meters bgs. TCE soil concentrations were as high as 83 mg/kg. Following the demonstration of controlled emplacement of 49 tonnes of zero-valent iron into the target treatment zone for chemical reduction of TCE in November 2014, a 5-yr performance monitoring program was initiated to evaluate treatment over time. After 30 months, the estimated mass of TCE decreased by ~92% and the total CVOC mass decreased by 82%. Groundwater data 36 months post-injection indicate that the total CVOC mass discharge from the treatment zone declined by >89%.
Slides: https://www.esaa.org/wp-content/uploads/2018/10/18-Ross.pdf
Longer abstract: https://www.esaa.org/wp-content/uploads/2016/05/RT2018-22-2..pdf

Research

ALTERNATIVES EVALUATION REPORT: PENOBSCOT RIVER PHASE III ENGINEERING STUDY, PENOBSCOT RIVER ESTUARY, MAINE

United States District Court, District of Maine, 221 pp, 2018

Beginning in 1967, a chlor-alkali facility located in Orrington, Maine, released mercury into the Penobscot River Estuary. Hg releases at overall declining concentrations continued throughout facility operation and ceased with facility closure in 2000. The slow rate of Hg concentrations decline in the area is attributable, in part, to the presence in the Estuary of a large pool of Hg-affected mobile sediment, which is retained in the Estuary by natural processes that result in the landward flow of both bottom water and associated sediment under the influence of tides. Following several extensive studies of this contamination issue, six remedial alternatives were evaluated for this report: (1) monitored natural recovery; (2) enhanced monitored natural recovery; (3) dredging; (4) thin layer capping in Mendall Marsh; (5) amendment application in Mendall Marsh; (6) dredging in intertidal and subtidal zones plus thin layer capping in Mendall Marsh. Bench-scale treatability studies were conducted to provide data for the development and evaluation of alternatives.
https://www.penobscotmercurystudy.com/documents/phase-iii-reports/alternatives-evaluation-report/alternative-evaluation-report-091218_text_tables.pdf The subsequent Phase III Engineering Study recommended a suite of remedies—thin layer capping, dredging, and long-term monitoring—to address various portions of the river. For more information, including the appendices to this report, see the Penobscot Study website: https://www.penobscotmercurystudy.com/information-repository/5bb761e5c6fe1b82044f6950

A MINI-REVIEW ON MECHANOCHEMICAL TREATMENT OF CONTAMINATED SOIL: FROM LABORATORY TO LARGE-SCALE

Cagnetta, G., J. Huang, and G. Yu.
Critical Reviews in Environmental Science and Technology 48(7-9):723-771(2018)

Destruction of persistent organic pollutants and immobilization of heavy metals and radionuclides in contaminated matrices by mechanochemical treatment has been demonstrated in several studies that illuminate the versatility of high-energy ball milling technology in the detoxification of contaminated soil. In this review, scientific and technological aspects of polluted soil mechanochemical treatment are discussed along with an economic feasibility study using technical and cost data obtained by constructors.
https://www.tandfonline.com/doi/full/10.1080/10643389.2018.1493336

DETECTION, TOXICOLOGY, ENVIRONMENTAL FATE AND RISK ASSESSMENT OF NANOPARTICLES IN THE AQUATIC ENVIRONMENT (DETER)

McGillicuddy, E., I. Murray, D. Shevlin, L. Morrison, M. Cormican, A. Fogarty, E. Cummins, et al.
Ireland Environmental Protection Agency, Wexford, Ireland. Report No. 259, 52 pp, 2018

Silver nanoparticles (AgNPs) are among the engineered nanomaterials most often incorporated in nanofunctionalized consumer products, such as plastics, soaps, pastes, metals, and fabrics. These nanoparticles also have applications in water and soil remediation. Owing largely to a dearth of appropriate detection methods, concentrations of AgNPs in the aquatic environment have primarily been estimated through modeling, with predicted environmental concentrations in the ng/L range. This report documents the results of a 3-year project conducted to (1) develop and implement methods for the detection of AgNPs in water; (2) determine the toxicological properties and environmental fate of AgNPs in the aquatic environment; and (3) develop risk assessment protocols that can be used to evaluate the environmental fate of and likely risk from AgNPs in aquatic pathways. http://www.epa.ie/pubs/reports/research/health/Research_Report_259.pdf

SLOW-RELEASE PERMANGANATE VERSUS UNACTIVATED PERSULFATE FOR LONG-TERM IN SITU CHEMICAL OXIDATION OF 1,4-DIOXANE AND CHLORINATED SOLVENTS

Evans, P.J., P. Dugan, D. Nguyen, M. Lamar, and M. Crimi.
Chemosphere 221:802-811(2019)

Slow-release permanganate and unactivated persulfate were evaluated for in situ treatment of 1,4-dioxane (DX) and associated chlorinated solvents. Lab batch studies with unactivated persulfate in deionized water or in soil and groundwater demonstrated DX removal with pseudo second-order rate constants ranging from 10^5 to 10^{-3}/M/s. Flow-through column studies demonstrated over 99% DX removal with slow-release unactivated persulfate but not with slow-release permanganate. The slow-release permanganate cylinders became coated with a rind that limited oxidant mass transfer and DX oxidation. In a field study conducted with slow-release persulfate cylinders transverse to groundwater flow, >99% removal of DX and chlorinated solvents was observed 2.5 m downgradient of the cylinders. Density-driven flow associated with the released persulfate was observed and attributed to a low horizontal hydraulic gradient. Most of the contaminant and persulfate flux was thought to be isolated to a deep aquifer zone bound by an underlying silt aquitard. Contaminant reductions were also observed in shallow groundwater samples. Persulfate oxidant cylinder longevity was an estimated 6-12 months. Careful consideration of cylinder placement during the design phase is needed to prevent the contaminant plume from bypassing and not contacting the released oxidant.

EFFECTS AND MECHANISMS OF MICROBIAL REMEDIATION OF HEAVY METALS IN SOIL: A CRITICAL REVIEW

Jin, Y., Y. Luan, Y. Ning, and L. Wang.
Applied Sciences 8(8):1336(2018)

Following a review of the origins and toxic effects of heavy metal pollution in soil, this paper describes the heavy metal accumulation mechanisms of microbes and compares their different bioconcentration abilities. Biosorption, which depends on the special structure of the cell wall, was found to be the primary mechanism. Furthermore, *Escherichia coli* were found to adsorb more heavy metals than other species. Factors influencing microbial treatment of wastewater and soil containing heavy metals included temperature, pH, and different substrates. In conclusion, problems in the application of microbial treatment of heavy metal contamination were considered with a discussion of possible directions for future research.
https://www.mdpi.com/2076-3417/8/8/1336/pdf

REACTOR DESIGN FOR ELECTROCHEMICAL OXIDATION OF THE PERSISTENT ORGANIC POLLUTANT 1,4-DIOXANE IN GROUNDWATER

Cottrell, P. Maxine, Master's thesis, Colorado State University, Fort Collins. 111 pp, 2018

A configurable mobile pilot-scale reactor was designed for testing electrochemical degradation performance under site-specific conditions and with different dimensionally stable electrode materials. Assessment of critical design parameters in a bench-scale reactor showed that 1,4-dioxane (DX) degradation rates almost doubled when no inter-electrode solid media were used. No significant differences were observed between operating the reactor in continuous versus batch mode. An additional 57% degradation rate improvement was achieved when the batch reactor was operated with 30-min polarity reversals as compared with constant polarity. Bench-scale reactor and initial pilot reactor tests with Ti/IrO_2-Ta_2O_5 electrodes were run using a synthetic groundwater solution containing DX in NaCl electrolyte, revealing substantial effects of scale, while DX degradation kinetics were similar. Groundwater from a contaminated industrial site was treated in the pilot reactor as well as in a commercial bench-scale reactor with a Magneli-phase titanium oxide anode. In comparison of the surface-area normalized rates of removal, the commercial reactor was faster than the pilot reactor, but it consumed more energy per order reduction and generated more undesirable reaction by-products. The ultimate design goal is to accommodate straightforward scale-up for field applications and low cost of production so that multiple modular units can be deployed to operate in series or in parallel.
https://mountainscholar.org/handle/10217/189359

POWER PLANTS: TURNING BROWNFIELDS GREEN

Clement, T.
Foreground — 20 Feb 2019

A design-led research experiment in Sydney, Australia, is using plants to clean a toxic post-industrial site for future redevelopment. In August 2018, a team led by Professor Sue Ann Ware of the University of Newcastle (UON) planted the first Power Plants garden, a 1000-m^2 plot on the eastern side of the White Bay Power Station. The team sowed seeds of more than two dozen annual plant species, all proven accumulators selected for their capacity to deal with the types of toxins on the site: heavy metals, BTEX, and pesticides. The multidisciplinary, collaborative project involves landscape architects, biologists, designers and artists from UON, University of Technology Sydney (UTS), and University of New South Wales as well as students from UON and UTS. Ware hopes to process the contaminated plants on site when the first garden is harvested in August 2019.
https://www.foreground.com.au/cities/power-plants-turning-brownfields-green-phytoremediation/

ELECTROKINETICALLY ENHANCED EMPLACEMENT OF LACTATE IN A CHLORINATED SOLVENT CONTAMINATED CLAY SITE TO PROMOTE BIOREMEDIATION

Inglis, Ainsley M., Master's thesis, University of Western Ontario. 122 pp, 2018

Using electrokinetics to enhance delivery of amendments and thereby stimulate bioremediation of chlorinated solvent contamination was tested at a field site where lactate was injected into clay under a direct current. Advection at locations with higher hydraulic conductivities contributed to transport of lactate and dilution of aqueous chlorinated solvents. There was evidence of successful delivery of lactate by electromigration (EM) in all monitoring locations at EM lactate transport rates ranging 1.3-3.0 cm/d. Lactate emplacement stimulated the indigenous bacterial populations, and evidence suggests some occurrence of chlorinated solvent biodegradation. https://ir.lib.uwo.ca/etd/5600/

APPLICATION OF PERSULFATE-OXIDATION FOAM SPRAYING AS A BIOREMEDIATION PRETREATMENT FOR DIESEL OIL-CONTAMINATED SOIL

Bajagain, R., S. Lee, and S.-W. Jeong.
Chemosphere 207:565-572(2018)

A persulfate-bioaugmentation serial foam-spraying technique was investigated for removing total petroleum hydrocarbons (TPHs) present in diesel-contaminated unsaturated soil. Feeding of remedial agents by foam spraying increased the infiltration/unsaturated hydraulic conductivity of reagents into the unsaturated soil. Persulfate mixed with a surfactant solution infiltrated the soil faster than peroxide, resulting in relatively even soil moisture content. Persulfate had a higher soil infiltration tendency, which would facilitate its distribution over a wide soil area, thereby enhancing subsequent biodegradation efficiency. Combined persulfate-bioaugmentation foam spraying degraded nearly 80% of soil TPH, whereas bioaugmentation foam spraying alone removed 52%. TPH fraction analysis revealed that the removal rate for the biodegradation-recalcitrant fraction (C_{18} to C_{22}) in deeper soil regions was higher for persulfate-bioaugmentation serial foam application than for peroxide-bioaugmentation foam application. Even at a low concentration, persulfate-foam spraying may be more effective than peroxide for TPH removal because persulfate-foam is more permeable and persistent and does not change soil pH in the subsurface.

THE HIGH PERFORMANCE SOLIDIFICATION/STABILIZATION PROCESS: A CASE STUDY OF PB IMMOBILIZATION THROUGH RECYCLING OF CONTAMINATED SOIL

Contessi, S., L. Calgaro, M.C. Dalconi, M. Secco, G. Ferrari, and G. Artioli.
REMEDIATE International Conference, 19-20 Sep 2018, Queen's University, Belfast. 34 slides, 2018

The high-performance solidification/stabilization (HPSS) process follows the principles of traditional S/S techniques, with the innovation of including a granulation step at the end of the process by using additives to produce cementitious granular materials. These pellets, characterized by low porosity and reduced leaching, could be reused as filling materials directly in the reclaimed area. The case study deals with the remediation of a former agriculture supply cooperative located in Bagnolo Mella, Italy, where the soil contains heavy metals. Pb poses special concerns for its high concentration and mobility, the latter enhanced in the alkaline conditions induced by the binder. This study aims for understanding at the molecular and microstructural level the immobilization mechanisms controlling Pb retention. Results indicate that Pb-containing soil minerals dissolve during the S/S process, leaving Pb dispersed within the cementitious matrix. By curing pellets in water with CO_2 addition, Pb leaching falls dramatically thanks to the lower pH and to the precipitation onto the pellet of an external layer of calcium carbonate. An additional step of water conditioning is proposed to improve binder maturation during the HPSS process and provide for a wider range of elements treated. **Slides:** http://www.remediate.eu/research-centres/Remediate/RemediateFilestore/Conference2018/Filetoupload,846344,en.pdf

SIMULATION-OPTIMIZATION APPROACH FOR THE CONSIDERATION OF WELL CLOGGING DURING COST ESTIMATION OF IN SITU BIOREMEDIATION SYSTEM

Yadav, B., S. Mathur, S. Ch, and B.K. Yadav.
Journal of Hydrologic Engineering 23(3):(2018)

Enhanced bioremediation techniques have the potential to change the hydrogeological properties of contaminated aquifers, most notably via biological clogging, resulting in reduction of porosity and hydraulic conductivity of the porous media. Biological clogging was accounted for during the cost optimization of an in situ bioremediation system. A simulation-optimization approach based on extreme learning machine and particle swarm optimization (ELM-PSO) techniques was used to design an optimal in situ bioremediation system for a characteristic site. A 2D finite-difference model was used to acquire the data for ELM training and testing. A single-objective function was considered to optimize pumping cost, facility capital cost, and well cleaning cost for a clogged well. Application of the ELM-PSO method where well clogging occurred provided a more practical and realistic cost for a typical in situ bioremediation system.

General News

ASSESSMENT AND MANAGEMENT OF STORMWATER IMPACTS ON SEDIMENT RECONTAMINATION: GUIDANCE DOCUMENT

Reible, D.
SERDP Project ER-2428, 15 pp, 2018

The recommended approach in this guide to assess and evaluate stormwater discharges and sediment recontamination is based upon the implementation of those practices in SERDP Project ER-2428 [https://www.serdp-estcp.org/content/download/47712/454846/file/ER-2428%20Final%20Report.pdf]. The recommended approach to stormwater characterization for sediment recontamination involves the following steps: (1) watershed characterization; (2) stormwater discharge monitoring; (3) sediment recontamination monitoring; and (4) stormwater and receiving water modeling. SERDP has selected a follow-on project to examine the effectiveness of stormwater best management practices (BMPs) relative to the characteristics identified here as contributing to sediment recontamination. The follow-on project (ER18-1371) will examine specific BMPs at use in naval bases for their ability to control contaminant and particulate distributions and the bioavailability of discharging contaminants. https://www.serdp-estcp.org/content/download/48431/460794/file/ER-2428%20Guidance.pdf

UPDATES: EXPOSURE FACTORS HANDBOOK

U.S. EPA, National Center for Environmental Assessment, Washington, DC.

These updates include new information that has become available since the release of the 2011 edition of the *Exposure Factors Handbook*. The recommended values for use in risk assessment have also been revised as needed to reflect the new information. https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236252

- Chapter 5: Soil and Dust Ingestion (2017 Update) http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=532518
- Chapter 9: Intake of Fruits (2018 Update) https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100V7TF.txt
- Chapter 11: Intake of Meats, Dairy Products and Fats (2018 Update) https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100UOGB.txt
- Chapter 12: Intake of Grains (2018 Update) https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100V7R1.txt
- Chapter 19: Building Characteristics (2018 Update) https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100UZMY.txt

ON THE LOOKOUT FOR PRACTICABLE SUSTAINABLE OPTIONS FOR ASBESTOS WASTE TREATMENT: A TECHNICAL, SUSTAINABILITY AND MARKET ASSESSMENT

Le Blansch, K., K. den Boeft, and J. Tempelman.
Bureau KLB, the Dutch Ministry for Infrastructure and Water Management, 126 pp, 2018

Asbestos fibers must be fully destroyed in a safe way before asbestos-containing materials (ACM) can be reused, which is the ideal in a circular economy; the alternative is simply safe storage. The Dutch government commissioned a systematic review of the development of techniques that make it possible to treat asbestos-containing waste and to reuse the remaining product instead of sending it to landfill in order to assess whether any technologies are ready for practicable sustainable application. Based upon extensive review of the literature and consultation with experts, the authors considered (1) maturity of the technique, (2) distance to market, (3) sustainability aspects, and (4) area of application for thermal, chemical, mechanical, and biological technologies. All the techniques considered for asbestos waste treatment were scored on a technology readiness scale. Results indicate that several of the techniques might have their own markets or niches of asbestos waste that they can treat most effectively and profitably.
https://www.rijksoverheid.nl/ministeries/ministerie-van-infrastructuur-en-waterstaat/documenten/rapporten/2018/07/17/assessment-of-asbestos-waste-treatment-techniques

MANAGING THE DIVERSITY OF ASBESTOS-CONTAINING MATERIALS (ACM)

Environmental Business Council of New England Inc.
EBC Site Remediation and Redevelopment Program, 85 slides, 2018

The presentations from June 4, 2018, program were collected in these slides. Topics included an overview of Massachusetts ACM regulations; case studies; issues of asbestos in soil; and planned vs. emergency removal of transite pipe.
http://ebcne.org/news/presentation-added-site-remediation-and-redevelopment-program-managing-the-diversity-of-asbestos-containing-materials-acm/

EMERGING CONTAMINANTS HANDBOOK

Bell, C.H., M. Gentile, E. Kalve, I. Ross, J. Horst, and S. Suthersan.
CRC Press, Boca Raton, FL. ISBN: 9781138062948, 439 pp, 2019

The first chapter of this book presents a framework and background on the regulatory context of emerging contaminants in general and then is followed by chapters that examine four contaminants at different stages in the emerging contaminant life cycle: 1,4-dioxane, per- and polyfluoroalkyl substances, hexavalent chromium, and 1,2,3-trichloropropane. The text reviews current information on the contaminants' sources, toxicology, regulation, and tools for characterization and treatment. The final chapter discusses opportunities in managing emerging contaminants to help balance uncertainty, compress life cycle, and optimize outcomes. *View the table of contents and chapter abstracts at* https://www.taylorfrancis.com/books/9781138062948.

SOIL POLLUTION: A HIDDEN REALITY

Rodriguez-Eugenio, N., M. McLaughlin, and D. Pennock.
Food and Agriculture Organization of the United Nations, Rome. ISBN 978-92-5-130505-8, 156 pp, 2018

This text aims to summarize the state of the art of soil pollution, identify the main pollutants and their sources affecting human health and the environment, and discuss pollutants that are present in agricultural systems and reach humans through the food chain. Several case studies of available techniques for assessing and remediating contaminated soils comprise the final chapter. This book has been developed within the framework of the Global Symposium on Soil Pollution (GSOP18), identifying the main gaps in knowledge on soil pollution worldwide and serving as a basis for future discussions. http://www.fao.org/3/I9183EN/i9183en.pdf

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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