

Technology Innovation News Survey

Entries for January 16-31, 2018

Market/Commercialization Information

IDIQ MATOCs FOR ENVIRONMENTAL RESTORATION SERVICES WITHIN THE LRD AND LRL MISSION BOUNDARIES

U.S. Army Corps of Engineers, USACE District, Louisville, KY.
Federal Business Opportunities, FBO-5931, Solicitation W912QR-18-R-0007, 2018

The USACE Louisville District intends to issue an RFP as a small business set-aside to establish IDIQ multiple-award task-order contracts (MATOCs) for Environmental Restoration Services within the Great Lakes and Ohio River Division (LRD) and Louisville District (LRL) mission boundaries. The Government intends to award up to seven small business IDIQ MATOCs to provide environmental and MMRP services in support of the LRL and LRD over a 5-year contract ordering period, maximum shared capacity not to exceed \$48M. These services may include control and remediation of environmental contamination from pollutants, toxic substances, munitions, and hazardous materials in addition to a variety of environmental compliance O&M tasks. Release of the RFP is anticipated on or about March 9, 2018. <https://www.fbo.gov/spg/USA/COE/DACA27/W912QR-18-R-0007/listing.html>

EPA WOMAN-OWNED SMALL BUSINESS OUTREACH EVENT

Environmental Protection Agency, Office of Small Business Programs, Washington, DC.
Federal Business Opportunities, FBO-5938, Solicitation Women_Owned_Outreach_2018

U.S. EPA's Office of Small and Disadvantaged Business Utilization will hold a Woman-Owned Small Business Outreach Event, "Empowering Woman-Owned Business," on Tuesday, March 27, 2018, from 10:00 AM - 12:00 noon at 1201 Constitution Avenue, NW, Washington, DC 20460, William Jefferson Clinton East Entrance. Each business can register for a 5-minute opportunity for face-to-face consultation with a procurement specialist or prime contractor regarding procurement or subcontracting opportunities. Attendees will be assigned a matchmaking time upon arrival. Only 2 representatives per firm may attend. Event registration will close on March 16. <https://www.fbo.gov/notices/cfb43f443125d89060e53df85956e156>

Cleanup News

REMOVAL ACTION COMPLETION REPORT: ELECTRICAL RESISTANCE HEATING IN SOURCE AREA, FORMER MERCURY CLEANERS SITE AREA, 1419 16TH STREET, SACRAMENTO, CALIFORNIA

California Regional Water Quality Control Board, Central Valley Region, 1102 pp, 2018

Mercury Cleaners operated as a dry cleaner from 1947 to 2014. The facility used a variety of dry cleaning solvents, and the site requires soil and groundwater treatment to remediate the impacts of petroleum-based Stoddard Solvent and of PCE and its daughter products. Cleanup began in 2015 with a soil vapor extraction (SVE) system pilot test, which is currently operating. To address soil contaminated with PCE above residential screening levels in an area ~40 ft by 40 ft in plan, a source area removal action was implemented in November 2016 using in situ electrical resistance heating (ERH) thermal desorption. Comprising 15 electrode/vapor recovery wells located within the source area, the ERH system was designed to volatilize VOCs in the subsurface for SVE system removal and treatment. The goal of the removal action was to reduce contaminant mass by > 99% and lower concentrations of TPH, PCE, and other VOCs below the soil and groundwater cleanup goals. ERH system operation ended on July 7, 2017. Although source area cleanup goals were not met completely, significant PCE mass was removed from the source area. http://geotracker.waterboards.ca.gov/esl/uploads/geo_report/5028631806/T10000003411.PDF

POST-REMEDIATION EVALUATION OF EVO TREATMENT: HOW CAN WE IMPROVE PERFORMANCE?

Borden, R.C.
ESTCP Project ER-201581, 151 pp, 2017

Enhanced reductive dechlorination (ERD) with emulsified vegetable oil (EVO) has been used at hundreds of sites to remediate chlorinated solvents, chromate, uranium, perchlorate, and explosive constituents. The process commonly involves injecting EVO, nutrients, pH buffer or base, and microbial cultures to adjust biogeochemical conditions in the immediate vicinity of the contaminant(s). Field, lab, and design evaluations of EVO use for TCE contamination at two sites at the former Naval Training Center Orlando are presented in this report. Although the remediation systems at both sites initially achieved substantial reductions in TCE concentrations, concentrations of cDCE and VC increased and remain elevated in some wells due to TCE degradation. Results from the project evaluations were used to identify the reasons for the ERD systems' failure to meet cleanup goals and to develop new approaches and procedures to improve performance. <https://www.serdp-estcp.org/content/download/46673/436329/file/ER-201581%20Final%20Report.pdf>

INTERIM MEASURES CONSTRUCTION REPORT, IN-SITU GROUNDWATER TREATMENT: FORMER ROD AND WIRE MILL AREA, TRADEPOINT ATLANTIC, SPARROWS POINT, MARYLAND

Maryland Department of the Environment, 349 pp, 2018

Parcel A3, the site of a rod and wire mill manufacturing complex, was part of a former integrated steel mill complex operated chiefly by Bethlehem Steel Corporation. Historical operations resulted in releases of cadmium and zinc to soil and groundwater. At Parcel A3, groundwater pump and treat operating since 2001 was suspended to allow the construction of remediation trenches in 2017. A blend of alkaline reagents [Terrabond^{MG} (40% by weight) and crushed limestone (60% by weight)] was placed into trenches arranged in a staggered/offset alignment perpendicular to groundwater flow. This arrangement corresponded with elevated concentrations of Cd and Zn within the intermediate zone groundwater. The alkaline reagent is expected to react with the low pH groundwater to increase the pH sufficiently to precipitate dissolved Cd and Zn as well as form chemical bonds that further limit Cd and Zn mobility in the groundwater. This report provides very early results of the performance of the interim measure. See this report and other technical information on work at the Tradepoint Atlantic site at <http://mde.maryland.gov/programs/LAND/MarylandBrownfieldVCP/Pages/SPVoluntaryCleanupProgram.aspx>.

2017 SECRETARY OF DEFENSE ENVIRONMENTAL AWARDS

Department of Defense, 20 pp, 2017

The Secretary of Defense recognized the environmental practices of **U.S. Army Garrison Bavaria, Germany**, with an Environmental Quality, Overseas Installation award. Among the efforts cited in the award, environmental program staff developed and implemented an innovative technique to decontaminate and clean up RDX residues in a limestone rock quarry within constructed wetlands via molasses-stimulated biological degradation. Compared to other proposed methods, this concept reduced construction costs from \$7,375,000 to \$2,330,000. The installation also partnered with host nation authorities to conduct and implement a joint study about contamination cleanup at the Class III Yard, which involved replacing groundwater pump and treat with a passive remediation solution that reduced annual costs from \$500,000 to \$40,000. **Travis Air Force Base, California**, received an Environmental Restoration, Installation award. The installation built the first-ever subgrade sulfate reactor as a petroleum-only contamination (POCO) technology demonstration that used sulfate-reduction biological treatment to accelerate the cleanup of fuel-soaked subsurface soil and dissolved petroleum contaminants. Scrap drywall destined for a landfill provided a source of sulfate for reactor construction. Travis AFB also used solar panel arrays to generate power for extraction pumps and to recirculate treated water at three Environmental Restoration Program sites and one POCO site. This innovation reduced annual energy consumption by 675,480 kilowatt-hours at an annual cost savings of \$37,000. See the awards brochure as well as individual facility fact sheets at <http://www.denix.osd.mil/awards/2017secdef/>.

FIRST FIVE-YEAR REVIEW REPORT FOR CAMILLA WOOD PRESERVING SUPERFUND SITE, MITCHELL COUNTY, GEORGIA

U.S. EPA Region 4, 134 pp, 2017

This site was operated from 1947 to 1991 by different owners as a wood preserving facility that used either coal tar creosote or a solution of 10% pentachlorophenol (PCP) for wood treating. The site was not divided into operable units for cleanup, and the soil and groundwater remedies for the entire site are addressed in this 5-year review. EPA remediated the western portion of the site in 2006 (prior to the ROD), and it continues to function as an athletic complex. In 2008, a small-scale in situ chemical oxidation (ISCO) study using potassium permanganate in multiple injection events was conducted. Following completion of soil excavation, storm water improvements, barrier wall installation, engineered cap installation, and the first full-scale ISCO injection event in October 2014, concentrations of carbazole, dibenzofuran, naphthalene, PCP, and 2-methylnaphthalene were still above remedial goals in shallow and intermediate groundwater monitoring wells, in addition to concentrations of manganese in the intermediate wells. A second full-scale ISCO injection event took place in April 2016. <https://semspub.epa.gov/src/document/04/11069996> The ISCO performance report was not available in time to be included in the 5-year review, but additional information is available in a presentation at <http://www.same.org/Portals/0/posts/philadelphia/documents/DCHWS/DCHWS2017/DCHWS2017Panel2Speaker2CarrieMcCoyBlackVeatch.pdf>.

Demonstrations / Feasibility Studies

PILOT STUDIES REPORT: FORMER SCHILLING AIR FORCE BASE, SALINA, KANSAS

Kansas Department of Health and Environment, 750 pp, 2017

Pilot studies of soil and groundwater remediation technologies were conducted in 2016 and 2017 at the former Schilling Air Force Base to support the

development and assessment of potential remedial strategies. Multiple dissolved-phase plumes (some commingled) of PCE, TCE, and carbon tetrachloride have been delineated at the site. The pilot studies and their respective findings include the following:

- Soil removal using large-bore augers: Found technically viable for removing impacted soil from the subsurface.
- Ex situ soil treatment using chemical oxidation with separate PersulfOx® and hydrogen peroxide pilot studies at varying dilutions: All dilutions found effective to reduce VOC concentrations.
- In situ thermal desorption (bench scale): Technically viable for soil remediation. See Appendix F for the basis of design report.
- Soil vapor extraction: Subsurface geology at test locations not suitable for traditional SVE.
- Groundwater pump and treat using air stripping and carbon polishing: Technically viable.
- Groundwater ZVI barrier with emulsified vegetable oil (EVO): May be technically viable.
- Enhanced bioremediation using EVO alone: May be technically viable.

http://www.kdheks.gov/remedial/Schilling_AFB/Schilling_PilotStudies.pdf

SURFACTANT ENHANCED EXTRACTION TO EXPEDITE REMEDIATION OF A CARBON TETRACHLORIDE SOURCE ZONE AT AN ACTIVE GRAIN ELEVATOR FACILITY

Dulle, E. and G. Ivey.

RemTech 2017: Remediation Technologies Symposium. Presentation 72, 46 slides, 2017

The site of an active grain elevator in Kansas City, Kansas, was entered into the State's voluntary cleanup program in 2000 following detection of CT in soil and groundwater near the former location of a fumigant aboveground storage tank. After dual-phase vacuum extraction (DPVE) over a 6-yr period removed > 9,000 lb of total VOCs, additional investigations revealed the location of a significant source area combining LNAPL and other contaminants of concern. In 2015 a pilot study of surfactant-enhanced extraction (SEE) was conducted at the site using a gravity-fed solution of 1-2% (by volume) Ivey-sol® 106 biodegradable surfactant. After a prescribed residence time, the surfactant solution, groundwater, and liberated contaminants were extracted using the DPVE system. The SEE pilot achieved CT groundwater concentration reductions of up to 99%. Full-scale SEE implementation is planned.

Longer abstract: <http://www.esaa.org/wp-content/uploads/2017/09/RemTech2017Abstracts-72.pdf>

Slides: <http://www.esaa.org/wp-content/uploads/2017/10/17-Ivey.pdf>

PILOT STUDY IMPLEMENTATION REPORT: LOWER COLUMBIA SLOUGH-PACIFIC MEATS CLEANUP SITE, PORTLAND, OREGON

Oregon Department of Environmental Quality (DEQ), 151 pp, 2017

This report documents the application of activated carbon (AC) products in the Lower Columbia Slough for a pilot study initiated in 2016 within the Slough waterway adjacent to the Pacific Meats Cleanup Site. Two forms of commercially available AC sediment amendments—Sedimite™ and AquaGate+PAC™—were installed to reduce bioavailability of elevated levels of PCBs in sediments. Shallow sediment sample PCB concentrations ranged from 69 µg/kg to 2,040 µg/kg, and deep sample PCB concentrations ranged from nondetect to 2,450 µg/kg. This report provides an assessment of delivery methods for applying AC to the target sediments; application of AC to the designated study area; and documentation of the implementability and costs of the AC amendment application methods and products. Future monitoring results will illuminate amendment effectiveness in reducing pore water concentrations of PCBs in the biologically active zone. <http://www.oregon.gov/deq/FilterDocs/PilotImpReport.pdf>

LOW-IMPACT IN-SITU PILOT USING SIMPLE ADDITIVE DELIVERY LEADS TO FULL-SCALE BIOSTIMULATION STRATEGY FOR DESTRUCTION OF RESIDUAL CVOCS

Armstrong, K.C. and G. Bell.

RemTech 2017: Remediation Technologies Symposium. Presentation 41, 30 slides, 2017

To address PCE contamination at the site of a former dry cleaner where biological treatment was considered unlikely to succeed, ERDenhanced™-filled Passive Release Sock (PRS) deployment units were evaluated in a pilot study to determine the capacity of the treatment to stimulate the native dehalorespiring populations and realize enhanced reductive dechlorination. ERDenhanced is a carbon-carbohydrate formulation of a proprietary macro-micro nutrient blend. Each PRS unit (2 units per deployment) was suspended within the saturated screened interval of a 2-inch monitoring well, with about 2 lbs of additive in each sock and replacement at 8-wk intervals. Four deployment events were conducted during the 26-wk evaluation. Groundwater monitoring, sampling, and analytical testing were performed for each event. Performance data confirmed that the additive stimulated enhanced reductive dechlorination by native dehalorespiring bacteria in the treatment zone. The significant reductions in contaminant concentrations achieved by the pilot led the regulators to approve a full-scale remediation strategy in July 2013 that combined source removal and biostimulation using ERDenhanced to address dissolved-phase and residual CVOCS at the site.

Longer abstract: <http://www.esaa.org/wp-content/uploads/2017/09/RemTech2017Abstracts-41.pdf>

Slides: <http://www.esaa.org/wp-content/uploads/2017/10/17-Armstrong.pdf>

DEGRADATION OF SULFOLANE IN SOIL USING AEROBIC BIO-PILE TECHNOLOGY

Yu, L., I. Keir, A. Giurici, G. Achari, and C. Langford.

RemTech 2017: Remediation Technologies Symposium. Presentation 17, 28 slides, 2017

Sulfolane, a toxic industrial solvent, has been used extensively to remove hydrogen sulfide and other polar compounds from natural gas. Owing to leaks and spills, the highly soluble compound has found its way into soil and groundwater. In this project, a lab feasibility study was conducted to investigate aerobic degradation of sulfolane in soil collected from a contaminated site. The promising lab results led to a field pilot study of sulfolane degradation using bio-pile technologies. The field work was conducted in Western Alberta, Canada, where ambient temperature varied from -3°C to 30°C from July 22 to October 9. Six bio-piles ranging from 25 m³ to 500 m³ were constructed on the sulfolane-contaminated site with variations in tarp cover, nutrient amendment, and aeration. Results showed that with proper aeration and nutrients, bio-pile treatment removed sulfolane at a rate of 42 mg/kg/day.

Longer abstract: <http://www.esaa.org/wp-content/uploads/2017/09/RemTech2017Abstracts-17.pdf>

Slides: <http://www.esaa.org/wp-content/uploads/2017/10/17-Yu.pdf>

Research

RAPID ASSESSMENT OF REMEDIAL EFFECTIVENESS AND REBOUND IN FRACTURED BEDROCK

Schaefer, C., D. Lippincott, K. Hatfield, and H. Klammler.

ESTCP Project ER-201330, 126 pp, 2017

A rapid assessment (RA) protocol was developed in this project to assess the potential effectiveness of in situ treatment by chemical oxidation or bioaugmentation. The RA protocol is intended to assess chlorinated ethene rebound, the potential of naturally occurring dechlorination reactions in low permeability zones, and remedial effectiveness using a pair of closely spaced bedrock wells. The RA technique involves identifying hydraulically conductive fracture zones, flushing contaminant from the fracture zones using water, and then evaluating contaminant rebound within this zone while hydraulically isolating the zone from the surrounding contaminated aquifer. The rate, composition, and isotopic signature of contaminant rebound is then used to evaluate the limits of remedial effectiveness, identify the local source/cause of any observed rebound, and improve the site conceptual model. Work was performed at the former Naval Air Warfare Center (NAWC) in Trenton, New Jersey, as a preliminary test site to develop the methodology. The former Naval Construction Battalion Center (NCBC) Davisville (Calf Pasture Point) in North Kingston, Rhode Island, was used for more quantitative purposes and evaluation of the RA testing protocol during rapid flushing of a TCE-contaminated zone using water spiked with bromide tracer. Results from the second site are the focus of this report. <https://www.serdp-estcp.org/content/download/46714/436649/file/ER-201330%20Final%20Report.pdf>

PHYTOSCREENING FOR VINYL CHLORIDE IN GROUNDWATER DISCHARGING TO A STREAM

Otosen, C.B., V. Ronde, S. Trapp, P.L. Bjerg, and M.M. Broholm.

Groundwater Monitoring & Remediation 38(1):66-74(2018)

An optimized phytoscreening method was used to locate a chlorinated ethene plume discharging into a stream. Trees along the stream bank were monitored through different seasons under different environmental conditions to evaluate seasonal uptake/loss scenarios. Detection of VC, cis-DCE, TCE, and PCE in the trees showed that phytoscreening is a viable method to locate chlorinated ethene plumes, including VC, discharging to streams. Phytoscreening for VC was found to be more sensitive to environmental conditions affecting transpiration than the other chlorinated ethenes detected. *This paper is temporarily Free Access* at <http://onlinelibrary.wiley.com/doi/10.1111/gwrm.12253/abstract>.

THE HORIZONTAL REACTIVE MEDIA TREATMENT WELL (HRX WELL®) FOR PASSIVE IN-SITU REMEDIATION

Divine, C.E., T. Roth, M. Crimi, A.C. DiMarco, M. Spurlin, J. Gillow, and G. Leone.

Groundwater Monitoring & Remediation 38(1):56-65(2018)

A new in situ remediation concept—the Horizontal Reactive Media Treatment Well (HRX Well®)—utilizes horizontal wells filled with reactive media (e.g.,

zero-valent iron, activated carbon, ion exchange resins, zeolite, apatite, chitin) for passive in situ treatment of contaminated groundwater. The horizontal wells generally are installed parallel to the direction of groundwater flow to leverage natural flow-focusing behavior induced by the high in-well hydraulic conductivity of the reactive media relative to the aquifer hydraulic conductivity. 3D flow and transport simulations showed that capture and treatment widths of up to tens of feet can be achieved for many aquifer settings, and reductions in downgradient concentrations and contaminant mass flux are nearly immediate. *This paper is temporarily Free Access at <http://onlinelibrary.wiley.com/doi/10.1111/gwmc.12252/full>. The HRX Well technology is currently in the process of demonstration and field validation under ESTCP project ER-201631.*
<https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Persistent-Contamination/ER-201631>.

THE IMPACT OF WELL-FIELD CONFIGURATION AND PERMEABILITY HETEROGENEITY ON CONTAMINANT MASS REMOVAL AND PLUME PERSISTENCE

Guo, Z. and M.L. Brusseau.
Journal of Hazardous Materials 333:109-115(2017)

The impact of different well-field configurations on pump-and-treat mass removal in a heterogeneous subsurface was simulated in a 3D numerical model with the metric to examine remediation efficiency provided by the relationship between reduction in contaminant mass discharge (CMDR) and mass removal (MR). Systems whose CMDR-MR profiles were below the 1:1 relationship line were associated with more efficient well-field configurations. The impact of domain heterogeneity on mass-removal effectiveness was investigated in terms of both variance and correlation scale of the random permeability distributions and indexed by the CMDR-MR relationship. Pump-and-treat data from the Tucson International Airport Area federal Superfund site were obtained for comparison between simulated and measured site data. Results from the field data case study are consistent with the conclusions of the theoretical study, which supports the general validity of the numerical model. See additional information on this study in **Appendix B** of Z. Guo's dissertation at <http://arizona.openrepository.com/arizona/handle/10150/578836>.

VAPOR INTRUSION RISK OF FUEL ETHER OXYGENATES METHYL TERT-BUTYL ETHER (MTBE), TERT-AMYL METHYL ETHER (TAME) AND ETHYL TERT-BUTYL ETHER (ETBE): A MODELING STUDY

Ma, J., D. Xiong, H. Li, Y. Ding, X. Xia, and Y. Yang.
Journal of Hazardous Materials 332:10-18(2017)

A modeling study conducted to investigate the vapor intrusion potential of MTBE, TAME, and ETBE indicated that MTBE is much more likely to cause vapor intrusion problems than TAME and ETBE. The authors' findings led them to recommend that EPA consider including the field measurement data of synthetic fuel additives in the existing Petroleum Vapor Intrusion Database.

DETERMINING GROUNDWATER MTBE SOURCES USING REVERSE PARTICLE TRACKING: TWO CASE STUDIES

Mohsen, F. and R. O'Boyle.
Environmental Forensics 18(4):272-284(2017)

In two case studies, low levels of MTBE were alleged to have entered residential wells from neighboring gas stations. Reverse particle tracking in the first case established that only 8 of 32 plaintiffs' residential wells could have been affected by MTBE migrating from the gas station. In the second case, reverse particle tracking identified a source farther upgradient from a suspected gas station source that explained the occurrence of MTBE contamination in a nursery as well as in residential wells downgradient of the gas station.

TETRACHLOROETHENE RELEASE AND DEGRADATION DURING COMBINED ERH AND SODIUM PERSULFATE OXIDATION

Costanza, J., T. Marcet, N.L. Capiro, and K.D. Pennell.
Groundwater Monitoring & Remediation 37(4):43-50(2017)

A study was conducted to determine the extent of PCE degradation during bench-scale thermal treatment of a PCE-contaminated silty clay loam using electrical resistance heating (ERH). The soil was collected from a contaminated area at a former dry cleaning facility. After 30 days of ERH, 52% of the initial PCE mass was recovered, potentially indicating that 48% of the PCE was degraded during ERH. The potential benefit of adding heat-activated sodium persulfate during treatment was evaluated in a second experiment. After 19 days of ERH and three persulfate injections, 93% of the initial PCE was recovered, with 3% PCE destruction based on chloride evolution. The difference in mass recovery between the first and second experiments might have been due to differences in the initial mass of PCE, even though both experiments used soil from the same core. Results suggest that most of the mass recovered during ERH of the PCE-contaminated soil at the former dry cleaning facility can be attributed to volatilization and gas phase extraction rather than abiotic degradation.

EFFECTS OF VARIABLE SITE CONDITIONS ON PHYTOREMEDIATION OF MIXED CONTAMINANTS: FIELD-SCALE INVESTIGATION AT BIG MARSH SITE

Reddy, K.R. and G. Amaya-Santos.
Journal of Environmental Engineering 143(9):(2017)

Big Marsh is a large wetland site contaminated with PAHs and heavy metals following decades of illegal waste dumping. Three different experimental areas, representative of three site ecotypes, were selected for a field-scale phytoremediation project. Nine native and restoration species were planted at each area and assessed over three growing seasons for their potential to survive and remediate the soil. Each area was tilled prior to planting, and compost was added to one of the areas. At the end of the third season, analysis of PAH and heavy metal concentrations in roots and shoots of the surviving species and in the soil samples collected in each growing season showed a decrease in PAH concentrations in the compost-amended area. In the unamended areas, PAHs uptake occurred only in the roots of the surviving species. Despite root uptake of metals by all the surviving species, no substantial changes were found in soil metal concentrations in the planted experimental areas.

A REVIEW OF CONTAMINATION OF SURFACE-, GROUND-, AND DRINKING WATER IN SWEDEN BY PERFLUOROALKYL AND POLYFLUOROALKYL SUBSTANCES (PFASs)

Banzhaf, S., M. Filipovic, J. Lewis, C.J. Sparrenbom, and R. Barthel.
Ambio 46(3):335-346(2017)

This review describes potential sources for PFASs to enter the drinking water supply in Sweden and compares different occurrences of PFASs in raw and drinking water in that country. Monitoring history, the legal situation, and remedial actions taken are also discussed.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5347527/>

MASS FLOW AND FATE OF PER- AND POLYFLUOROALKYL SUBSTANCES IN A LANDFILL IN UPPSALA, SWEDEN

Bonnet, Bjoern Frederik, Master's thesis, Swedish University of Agricultural Sciences, Uppsala. 68 pp, 2017

In a study of PFAS translocation from a landfill via drainage into nearby water systems, distribution and fate of 28 PFASs were analyzed in drainage water, sewage sludge, and groundwater all across the landfill area and in the receiving water courses. The total mass flow of PFASs exiting the landfill was estimated at 220 mg/g. The mass flow in the river showed no long-range effect (30 km) of the landfill PFASs on surface waters; instead, PFASs from the landfill appeared to present a greater threat to the local groundwater. The study included assessment of an on-site drainage water treatment system in terms of PFAS removal efficiency. The treatment system showed efficiencies of around 50% for the simple treatment techniques applied (i.e., aeration, moving bed biofilm reactor, sedimentation pond, polishing ponds/lakes, and oxidation pond). <https://stud.epsilon.slu.se/13052/>

REVIEW OF THE FATE AND TRANSFORMATION OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFASs) IN LANDFILLS

Hamid, H., L.Y. Li, and J.R. Grace.
Environmental Pollution 235:74-84(2018)

Despite its restricted use, PFOA remains one of the most abundant perfluorinated alkyl acids (PFAAs) in landfill leachates. The presence of PFAA precursors (e.g., saturated and unsaturated fluorotelomer carboxylic acids) also has been documented in landfill leachates at high concentrations. Landfill ambient air has been found to contain elevated concentrations of PFASs, primarily semi-volatile precursors (e.g., fluorotelomer alcohols), compared to upwind control sites, which suggests that landfills are potential sources of atmospheric PFASs. PFAS fate inside landfills is controlled by a combination of biological and abiotic processes, with biodegradation releasing most of the PFASs from landfilled waste to leachate. Determination of PFAA precursors and their degradation products is recommended for future studies to avoid significant underestimation of total PFAS released from landfills.

PERMEABLE BIOSORBENT BARRIER FOR WASTEWATER REMEDIATION

Silva, B., E. Tuuguu, F. Costa, V. Rocha1, A. Lago, and T. Tavares.
Environmental Processes 4(Suppl 1):195-206(2017)

In a study of Cr(III) removal from surface water by a permeable barrier, the adsorption capacity of 13X zeolite and vermiculite was investigated at different sorbent dosages, pH, and initial Cr(III) concentration in a lab-scale reactor set up to simulate a permeable barrier. 13X zeolite had the better performance for Cr removal in the permeable barrier assays, achieving 96% total Cr removal and a global uptake of 2.49 mg/g. Neither barrier had reached Cr saturation after

13 days of operation. Additionally, a fungal isolate identified as belonging to *Alternaria alternata* was obtained from sediment samples and selected from enriched Luria-Bertani medium. After 50 h of cellular growth the fungal isolate was able to remove 78.2% and 47.9% of Cr(III) at initial concentrations of 50 mg/L and 100 mg/L, respectively. https://repositorium.sdum.uminho.pt/bitstream/1822/47024/1/document_46729_1.pdf

General News

RECENT TRENDS IN THE SELECTION OF REMEDIES FOR GROUNDWATER, SOIL, AND SEDIMENT AT SUPERFUND SITES

Fiedler, L. and C. Pachon.
Groundwater Monitoring & Remediation 38(1):13-18(2018)

To evaluate remedy selection trends, the U.S. Environmental Protection Agency compiles data on remedies selected in decision documents—records of decision (RODs), ROD amendments, and Explanations of Significant Differences—for the Superfund sites on the National Priorities List. The Agency extracts specific information from the documents concerning the approach to cleanup. EPA's *Superfund Remedy Report (SRR), 15th Edition (2017)* added compiled data for remedies selected in over 300 Superfund decision documents signed from October 2011 to September 2014. Remedies were counted by specific technology or approach and also grouped into categories, such as treatment, on-site containment, off-site disposal, monitored natural attenuation, and institutional controls. The update included vapor intrusion mitigation remedies. This editorial summarizes the report; the full report at <https://clu-in.org/asr/>, provides additional analyses and detail. *This editorial is temporarily Free Access* at <http://onlinelibrary.wiley.com/doi/10.1111/gwrm.12260/full>.

ECOSYSTEM SERVICES AT SUPERFUND SITES: REUSE AND THE BENEFIT TO COMMUNITY

U.S. EPA, Superfund Redevelopment Initiative, 27 pp, 2017

Superfund cleanups often include efforts to restore ecosystems that have been damaged or destroyed by contamination. Today, hundreds of Superfund sites support ecological reuses, from grassland habitats to wetlands and forests. Ecological reuse of Superfund sites allows communities to reclaim lost land, provides important habitat, creates green space, protects water resources, improves property values, sequesters carbon, and helps remove the stigma associated with formerly contaminated lands. This publication explores how ecosystems generate economic benefits and provides examples of ecosystem services at Superfund sites across the country. <https://semspub.epa.gov/src/document/HQ/176440>

GROUNDWATER INFORMATION SHEET: METHYL TERTIARY-BUTYL ETHER (MTBE)

California State Water Resources Control Board, Division of Water Quality, GAMA Program, 10 pp, 2017

The information in this fact sheet was compiled by the staff of the Groundwater Ambient Monitoring and Assessment (GAMA) Program to provide general information regarding MTBE. The information was pulled from a variety of sources and relates mainly to drinking water. References are provided as sources of additional information. https://www.waterboards.ca.gov/gama/docs/coc_mtbe.pdf

INNOVATIVE REUSE AND BENEFICIAL USE OF DREDGED MATERIAL: GUIDANCE DOCUMENT

Maryland Department of the Environment (MDE), Baltimore, MD. 94 pp, 2017

This guide was prepared to describe the policies and procedures for reviewing proposed beneficial use and innovative reuse projects utilizing dredged material in the State of Maryland. Potential beneficial uses include several in-water uses (beach nourishment, marsh creation, island restoration) as well as innovative reuse applications on land (brownfield cleanup, landfill daily cover, engineered fill/soil). Although written with Maryland regulations in mind, the guide offers ideas and considerations for dredged material reuse that might be of interest for projects in other jurisdictions.

http://mde.maryland.gov/programs/Marylander/Documents/Dredging/FINAL_IBR_GUIDANCE_8.30.2017_MDE.pdf

VALIDATION OF PASSIVE SAMPLING DEVICES FOR MONITORING OF MUNITIONS CONSTITUENTS IN UNDERWATER ENVIRONMENTS: TECHNOLOGY USER'S MANUAL

Rosen, G., R. George, and W. Wild.
ESTCP Project ER-201433, Version 1.2, 26 pp, 2017

The polar organic chemical integrative sampler (POCIS) is designed to sample the more water-soluble organic chemicals with log octanol-water partition coefficients, which includes munitions constituents such as TNT, RDX, and their major transformation products. Munitions monitoring has been tested and verified using the standard commercially available POCIS. This manual describes the effective implementation of POCIS samplers for longer-term (i.e., 8 days or more) sampling efforts. <https://www.serdp-estcp.org/content/download/46679/436387/file/ER-201433%20User%20Guide.pdf> The ESTCP final technical report for project ER-201433 (Rosen et al. 2017) was the source of much of the input to this user's guide and should be consulted as necessary.

<https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Sediments/ER-201433>

STUDIES OF RISK AND DOSE ASSESSMENT MODELS FOR RADIOACTIVELY CONTAMINATED SITE SOILS

U.S. EPA, Preliminary Remediation Goals for Radionuclides Website.

Three documents on comparison studies of radiation risk and dose assessment models for legacy sites were prepared by Nasser Shubayr, a participant from the Oak Ridge Institute for Science and Education Research Participation Program while at EPA's Office of Superfund Remediation and Technology Innovation in 2017. The three documents focus on risk and dose assessment models recommended by governmental agencies for investigating radioactively contaminated sites.

- Overview of Radiation Risk and Dose Assessment Models for Radioactively Contaminated Sites and Selected Default Input Parameters.
- Handbook of Parameters for U.S. and International Governments Risk and Dose Assessment Models for Remediation of Radiologically Contaminated Soil (PRG/DCC, RESRAD, NORMALISA, RCLEA, RSRARS, WISMUT and NCRP).
- Study of Chemical and Radiation Risk Assessment Methods for the United States Environmental Protection Agency and the Environment Agency of the United Kingdom.

The three research studies are available at https://epa-prgs.ornl.gov/radionuclides/prg_comparison.html.

HANDBOOK OF RESEARCH ON INVENTIVE BIOREMEDIATION TECHNIQUES

Bhakta, J.N. (ed).
IGI Global, Hershey, PA. EISBN13: 9781522523260, 624 pp, 2017

Highlighting research perspectives on topics such as mycoremediation, microbial tools, and green technology, this publication is designed for academics, professionals, graduate students, and practitioners interested in emerging techniques for environmental decontamination. See *the table of contents and chapter abstracts* at <https://www.igi-global.com/book/handbook-research-inventive-bioremediation-techniques/173682>.

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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