Technology Innovation News Survey

Entries for September 16-30, 2018

Market/Commercialization Information

BASE NOTICE: STRATEGIC ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM (SERDP) CORE

U.S. Army Corps of Engineers, USACE HEC, Ft. Belvoir, Alexandria, VA.
Federal Business Opportunities, Solicitation W912HQ-19-S-0001, 2018

DoD's Strategic Environmental Research and Development Program (SERDP) Office intends to competitively fund projects for environmental research that address the statements of need posted at https://www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations/Core-SONs. Multiple awards totaling ~$12M are anticipated, depending on the quality of proposals received and availability of funds. Awardees will be selected through a multi-stage review process that begins with submittal of brief pre-proposals for Government consideration without incurring the expense of a full proposal. Each party will be notified as to whether or not SERDP requests submission of a full proposal. Pre-proposals must be received by 2:00 PM ET on January 8, 2019. SERDP is interested in receiving pre-proposals from organizations both large and small on the following topics:

- **ERSON-20-C1:** Biodegradation of per- and polyfluoroalkyl substances (PFASs) found in aqueous film-forming foams.
- **ERSON-20-C2:** Development of passive sampling methodologies for PFASs.
- **ERSON-20-C3:** Development of analytical methods to assess leaching and mobility of PFASs from soils, sediments, and solid wastes.
- **ERSON-20-C4:** Quantitative groundwater plume characterization to support transition assessments.
- **ERSON-20-C5:** Forensic methods for source tracking and allocation of PFASs.
- **MRSON-20-C1:** Detection, classification, and remediation of military munitions underwater.
- **RCSON-20-C2:** Response of DoD-relevant marine mammal populations to multiple stressors.
- **WPSON-20-C5:** Development of new approaches for demilitarization of conventional military munitions.

https://www.fbo.gov/spg/USA/COE/DACA72/W912HQ-19-S-0001/listing.html

BASE NOTICE: STRATEGIC ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM (SERDP) EXPLORATORY DEVELOPMENT (SEED) PROGRAM

U.S. Army Corps of Engineers, USACE HEC, Ft. Belvoir, Alexandria, VA.
Federal Business Opportunities, Solicitation W912HQ-19-S-0002, 2018

The SERDP Exploratory Development (SEED) solicitation is a means for researchers to test proof of concept during an effort of about one year. These projects will be funded at a level not to exceed $200,000 in total cost. Successful SEED projects may lead to more extensive follow-on research or development efforts. For projects to be funded in FY 2020, SERDP is seeking proposals responding to SEED statements of need posted at https://www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations/SEED-SONs. Listed under Munitions Response is **MRSEED-20-S1:** Detection, Classification, and Remediation of Military Munitions Underwater. Proposals must be submitted prior to 2:00 PM ET on March 5, 2019.
https://www.fbo.gov/spg/USA/COE/DACA72/W912HQ-19-S-0002/listing.html

ARGONNE SEEKS PARTNERS TO COMMERCIALIZE OLEO SPONGE TECHNOLOGY

Argonne National Laboratory, 28 July 2018

The Oleo Sponge, developed by Argonne National Laboratory, is a novel absorbent for removing oil spills from water. It can absorb up to 90 times its own weight in oil, is reusable, and can collect oil both above and below the water's surface. The product is created from low-cost materials by chemically treating a polymer foam such as polyurethane. Ordinary polyurethane foam is not effective for removing oil from water because the surface of polyurethane is neither oleophilic (oil-attracting) nor hydrophobic (water-repelling). When polyurethane foam is immersed in an oil/water mixture, it will absorb both substances more or less equally. In contrast, Oleo Sponge is simultaneously highly oleophilic and highly hydrophobic, so that it rapidly and selectively absorbs oil from an oil/water mixture. These properties are imparted by performing a 2-step surface chemical treatment. In the first step, the foam is impregnated with an ultra-thin, inorganic coating using sequential infiltration synthesis. This coating primes the surface for the second step in which the resulting surface is functionalized with an oleophilic monolayer using silanization, a self-limiting surface chemical reaction. Oleo Sponge was recognized by R&D Magazine in 2017 with an R&D 100 Award for technology innovation. https://www.anl.gov/article/argonne-seeks-partners-to-commercialize-oleo-sponge-technology **Licensing:** Contact 1-800-627-2596 or partners@anl.gov.

OPERATIONS MAINTENANCE FOR UMATILLA CHEMICAL DEPOT (UMCD) GROUNDWATER PUMP AND TREATMENT SYSTEM (GETS), HERMISTON, OR

U.S. Army Corps of Engineers, USACE District, Seattle, WA.
Federal Business Opportunities, Solicitation W912DW-020493-DAK, 2018

This sources sought constitutes a market survey to gain knowledge of the interest, capabilities, and qualifications of interested contractors within the Seattle District's geographic area of responsibility for operations and maintenance support for the explosives washout lagoons groundwater extraction and treatment system (GETS) at Umatilla Chemical Depot. All small business categories are invited to respond under NAICS code 562910 (Remediation Services). Responses will be used by the Government in acquisition planning. The anticipated period of performance is a 3-year base period plus two 1-year option periods. All work is to be performed at the Umatilla Chemical Depot East Washout Lagoon CERCLA site. The objectives of this project are to provide up to five successful years of continuous operations and maintenance services for the GETS. Contractor responsibilities shall include operating the GETS substrate injection system for bioremediation testing and providing temporary power to the work site. Capabilities statements must be received by 2:00 PM PT on November 23, 2018.
https://www.fbo.gov/spg/USA/COE/DACA67/W912DW-020493-DAK/listing.html

TA-21 DELTA PRIME SITE AGGREGATE AREA DELAYED SITES PROJECT

U.S. DOE, Newport News Nuclear BWXT-Los Alamos, LLC (DOE Contractor), Los Alamos, NM.
Federal Business Opportunities, Solicitation 0000186, 2018

This solicitation will result in award of a firm-fixed-price contract. The successful offeror shall furnish qualified management, personnel, equipment, materials, supplies, and facilities to perform deactivation and decommissioning activities at Los Alamos National Laboratory Technical Area 21 in New Mexico. Work scope includes abatement of hazardous materials; completion of site/waste characterization, sampling, reporting, and remediation of remaining facilities, structures, and industrial waste lines; and removal of contaminated soils. The subcontractor will also be required to locate, excavate, remove, size reduce, package, and load the DP West radiological industrial waste lines (~5,900 LF). In addition, the successful offeror will perform nature and extent sampling, risk assessments, and investigation report development. The NAICS code for this procurement is 562910 (Environmental Remediation). Proposals must be received electronically by 3:00 PM MT on December 20, 2018. https://www.fbo.gov/notices/a57cb53bc40614b8c615563f05f50381

Cleanup News

IN-SITU THERMAL DESORPTION OF HYDROCARBON-IMPACTED SOIL

Haemers, J., H. Saadaoui, P. Vilette, and A. Vandekerckhove.
NORDROCS 2018: 7th Joint Nordic Meeting on Remediation of Contaminated Sites: Poster.

Leaking domestic fuel oil from an underground tank affected a residential area in the north of Copenhagen, where unacceptable hydrocarbon concentrations were detected under the terrace of a private house, mainly in the garden. In situ thermal desorption (ISTD) was implemented to vaporize the contamination. The vapors were extracted, collected, and recycled in the reburn system. The soil target zone was estimated at 5,700 m^3. Most the groundwater lies below the contaminated zone. The average concentration of total hydrocarbons in soil was close to 1,000 mg/kg (DM) with a maximum concentration of 22,000 mg/kg (DM). The total mass of hydrocarbons in the soil was estimated at ~12,000 kg. The contaminated zone was treated in two batches. Treatment was carried out in 65 days for batch 1 and 69 days for batch 2. Treatment was considered complete when the target temperature of 220°C was reached and the vapor concentrations of collected hydrocarbons tended toward zero. The project was accomplished without environmental disturbance (dust, etc.) and in complete transparency. Data were made available to all stakeholders on a daily basis to track changes in the thermal desorption process. ISTD treatment of ~10,000 tons of hydrocarbon-contaminated soil at this residential site was completed successfully in a few months with 128 heating tubes in a surface area of 400 m^2 at depths of 12-18 m. https://haemers-technologies.com/wp-content/uploads/2018/07/I-17-02-VEDBAEK-DENMARK-UK-.pdf *View installation of the ISTD system in a brief YouTube video at* https://www.youtube.com/watch?v=znuA0rAM-kU.

REMEDIATION OF A FORMER INDUSTRIAL LANDFILL USING A MULTIFUNCTIONAL ACTIVE SURFACE SEALING

Thimm, K., O. Syllwasschy, H. Lassnig, and S. Westhus.
NORDROCS 2018: 7th Joint Nordic Meeting on Remediation of Contaminated Sites, 28 slides, 2018

The K20 contaminated site, a former industrial landfill (1926-1981), is situated in the lower part of the Gurktal valley in Austria. The landfill is separated into two sections that contain calcium carbide, chlorinated hydrocarbons (CHCs), and mercury-contaminated wastes. The CHCs are mainly PCE, TCE,

hexachlorobutadiene, hexachloroethane, and hexachlorobenzene. In 2009, a notice was issued to remediate the high-priority site through the complete removal of all waste material for reuse, treatment, or disposal; however, clearance of the site was discontinued when significant hexachlorobenzene contamination was detected in 2014. Securing the material on site was determined the next best option. To prevent emissions from the remaining materials, new physical safeguard measures were installed: an innovative, multifunctional surface-sealing system consisting of an 11 kg/m² calcium bentonite geosynthetic clay liner; an active geo-composite mat with 2 kg/m² activated carbon; an LDPE membrane with integrated aluminum layer; and a drainage element. This system is a strong barrier for volatile CHCs. The activated carbon mat was installed below the membrane to reduce CHC concentrations at the interface of the membrane and thereby reduce the driving force for diffusion. Soil vapor extraction pipes installed below and above the sealing system allow for both treatment and continuous monitoring. For long-term stability of the whole sealing system, two layers of geogrids were installed to provide adequate stability against slip parallel to the slope. https://www.intersol.fr/download/28032018/download.php?f=Intersol_2018_6-Kristof_Thimm_Huesker.pdf

ENVIRONMENTAL REMEDIATION AT THE MOISIE FORMER ROYAL CANADIAN AIR FORCE RADAR STATION, SEPT-ILES, QC

Pouliot, Y., B. Michaud, J. Gagnon, and A. Martin.
2018 RPIC Federal Contaminated Sites National Workshop, 13-15 June, Toronto, ON. 31 slides, 2018

The Air Force Base in Moisie near Sept-Iles (QC), a former Pinetree Line Radar station, was in operation from 1953 to 1988 as part of NORAD. Base activities led to contamination of the soil and groundwater by fuel oil and used motor oil. Environmental site assessments showed the presence of ~10,600 m³ of contaminated soil at 4-10 m bgs, including 4,000 m³ below the water table. The site is located on a sandy point lying between an important salmon river and the St. Lawrence Estuary. From the nine bidders who responded to the request for proposals, the successful bidder retained the approach of excavating the contaminated soil and treating it using an on-site biopile technology. A 3-yr contract was awarded in December 2015. The project faced the following challenges: project acceptance by the local population and Innu First Nation; multiple land owners; the presence of a 50 m long building above the excavation area; the need to dewater the excavation zone; and temporary displacement of 87,500 m³ of uncontaminated soil above the contaminated soil during excavation. The main portion of the contaminated soil (11,900 m³) was placed in the biopile in September 2016 and reached the remedial criteria within four months of treatment. The second portion (2,407 m³) should complete remediation in 2018.
http://rpic-ibic.ca/images/2018_FCSW_/Presentations/5_-_162_-_Martin_ENG_REV.pdf

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

Fogas, C., M. Kozar, B. Bakrania, and E. Schleicher.
Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies, May 22-25, 2017, Miami, FL. 30 slides, 2017

Enhanced in situ bioremediation 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. EVO plus bioaugmentation was selected for long-term passive treatment in this difficult urban setting. A total of 25,937 lbs of Newman Zone® Standard EVO at 10% concentration (31,438 gal in solution) was injected in the bioremediation treatment zones over a period of 14 days. Injection through permanent monitoring wells (installed by rotosonic drilling) was selected owing to the difficult drilling environment (tight till with gravel and cobbles). This presentation outlines the remedial approach, implementation, and progress. https://www.obg.com/uploads/insights/Battelle_Presentation_Fogas.pdf

Demonstrations / Feasibility Studies

CONSTRUCTION REPORT: ENHANCED NATURAL RECOVERY/ACTIVATED CARBON PILOT STUDY, LOWER DUWAMISH WATERWAY

Lower Duwamish Waterway Group, 339 pp, 2018

The Lower Duwamish Waterway Group is conducting a field pilot study to evaluate the potential effectiveness of an innovative sediment technology in the Lower Duwamish Waterway (LDW). The study will determine whether enhanced natural recovery (ENR) material amended with granular activated carbon (AC) can be applied successfully to reduce the bioavailability of PCBs in remediating contaminated LDW sediments. The study compares the effectiveness of ENR with added AC (ENR+AC) versus ENR without added AC in three areas: the intertidal plot, subtidal plot, and scour plot. Each plot comprises two subplots, one with ENR alone, the other with ENR+AC. For the ENR portion of this project, a thin layer of clean material (sand or gravelly sand) was placed over subtidal and intertidal sediments. For the ENR+AC portion, a thin layer of clean material augmented with AC was placed over subtidal and intertidal sediments. The goal of the study is to evaluate the performance of ENR+AC compared to ENR in reducing PCBs bioavailability over a 3-yr monitoring period.
https://www.ldwg.org/rifs_docs.htm#activated

CONCURRENT TREATMENT OF 1,4-DIOXANE AND CHLORINATED ALIPHATICS IN A GROUNDWATER RECIRCULATION SYSTEM VIA AEROBIC COMETABOLISM

Chu, M.Y.J., P.J. Bennett, M.E. Dolan, M.R. Hyman, A.D. Peacock, A. Bodour, R. Hunter, et al.
Groundwater Monitoring & Remediation 38(3):53-64(2018)

A 265-day field trial of in situ aerobic cometabolic biodegradation (ACB) of 1,4-dioxane and chlorinated co-contaminants was conducted at Operable Unit D at the former McClellan Air Force Base. The in situ ACB reactor was established through amending recirculated groundwater with propane and oxygen. The stimulated indigenous microbial population was consistently able to degrade 1,4-dioxane to < 3 µg/L while the co-contaminants TCE and 1,2-DCA declined to < 1 µg/L and 0.18 µg/L, respectively. The field trial achieved a stable treatment efficiency of > 95% removal for 1,4-dioxane and 1,2-DCA and > 90% removal for TCE. High treatment efficiencies for 1,4-dioxane and all co-contaminants were sustained even without propane and oxygen addition for a 2-week period. *See additional information in a poster at*
http://www.haleyaldrich.com/Portals/0/Downloads/battelle-chlorinated/aerobic-cometabolic-biodegradation-groundwater-14dioxane-haleyaldrich-battelle.pdf.

A COMBINED FIELD AND LABORATORY STUDY ON ACTIVATED CARBON-BASED THIN LAYER CAPPING IN A PCB-CONTAMINATED BOREAL LAKE

Abel, S. and J. Akkanen.
Environmental Science & Technology 52(8):4702-4710(2018)

Applying a strong sorbent like activated carbon (AC) directly to the surface of contaminated sediment can greatly reduce the bioavailability of organic pollutants. To evaluate the method under realistic field conditions, a 300 m² plot in PCB-contaminated Lake Kernaalanjarvi, Finland, was amended with an AC cap (1.6 kgAC/m²). During the 14-month monitoring period, the study lake showed highly dynamic sediment movements, which led to poor retention and rapid burial of the AC cap under a layer of contaminated sediment from adjacent sites. As a result, the measured impact of the AC amendment was low; both the benthic community structure and PCB bioaccumulation were similar on the plot and in surrounding reference sites. Corresponding follow-up lab studies using *Lumbriculus variegatus* and *Chironomus riparius* showed that long-term remediation success is possible, even when an AC cap is covered with contaminated sediment. To retain measurable effectiveness (reduction in contaminant bioaccumulation), a sufficient intensity and depth of bioturbation is required. *This paper is* ***Open Access*** *at* https://pubs.acs.org/doi/full/10.1021/acs.est.7b05114.

SUSTAINED IN SITU CHEMICAL OXIDATION (ISCO) OF 1,4-DIOXANE AND CHLORINATED VOCS USING SLOW-RELEASE CHEMICAL OXIDANT CYLINDERS: ESTCP COST AND PERFORMANCE REPORT

Evans, P., J. Hooper, M. Lamar, D. Nguyen, P. Dugan, M. Crimi, and N. Ruiz.
ESTCP Project ER-201324, 73 pp, 2018

This study demonstrated the use of slow-release chemical oxidant cylinders to treat a plume containing 1,4-dioxane and chlorinated VOC constitutents. Unactivated persulfate embedded in a slow-release paraffin wax formulation was emplaced in two 4-inch wells housed inside 18-inch diameter boreholes. The objectives were to demonstrate/evaluate the technology effectiveness, sustainability/ longevity, oxidant transport and destruction, implementability/secondary water quality impacts, and technology reproducibility. The demonstration met the majority of the performance objectives.
https://www.serdp-estcp.org/content/download/47863/456084/file/ER-201324%20Cost%20&%20Performance%20Report.pdf

ELECTROKINETIC-ENHANCED (EK-ENHANCED) AMENDMENT DELIVERY FOR REMEDIATION OF LOW PERMEABILITY AND HETEROGENEOUS MATERIALS: ESTCP COST AND PERFORMANCE REPORT

Cox, E., J. Wang, D. Reynolds, D. Gent, and M. Singletary.
ESTCP Project ER-201325, 72 pp, 2018

EK-enhanced amendment delivery for in situ bioremediation (EK-BIO) was demonstrated and validated via enhanced reductive dechlorination of a PCE source area in clay. The EK-enhanced amendment delivery technology entails the establishment of an electric field in the subsurface using a network of electrodes. The electrical current and voltage gradient established across a direct-current electric field provide the driving force to transport remediation amendments, including electron donors, chemical oxidants, and even bacteria, through the subsurface. Results showed that EK could achieve relatively uniform transport in low-permeability materials. https://www.serdp-estcp.org/content/download/47833/455819/file/ER-201325%20Cost%20&%20Performance%20Report.pdf

Research

WHAT'S THE POINT? THE CONTRIBUTION OF A SUSTAINABILITY VIEW IN CONTAMINATED SITE REMEDIATION

Anderson, R., J. Norrman, P.-E. Back, T. Soederqvist, and L. Rosen.
Science of the Total Environment 630:103-116(2018)

The sustainable remediation concept has brought increased attention to the often overlooked contradictory effects of site remediation. The SCORE tool used in this analysis is based on a holistic multi-criteria decision analysis approach to assess sustainability in three dimensions: environmental, social, and economic. Analysis of four real case study sites in Sweden revealed that the decision support outcome from a full sustainability assessment often differed from that of other assessment views and resulted in remediation alternatives that balanced trade-offs in most of the scenarios. In relation to the public perspective and traditional scope, which was seen to lead to the most extensive and expensive remediation alternatives, the trade-off was related to less contaminant removal in favor of reduced negative secondary effects, such as emissions and waste disposal. Compared to the private perspective associated with the lowest-cost alternatives, the trade-off was higher costs but more positive environmental and social effects. Both the green and traditional assessment scopes generally missed out on relevant social and local environmental secondary effects, which might be very important for the actual remedial decision.
http://isiarticles.com/bundles/Article/pre/pdf/103564.pdf

PENTACHLOROPHENOL, POLYCHLORINATED DIBENZO-P-DIOXINS AND POLYCHLORINATED DIBENZO FURANS IN SURFACE SOIL SURROUNDING PENTACHLOROPHENOL-TREATED UTILITY POLES ON THE KENAI NATIONAL WILDLIFE REFUGE, ALASKA, USA
Verbrugge, L.A., L. Kahn, and J.M. Morton.
Environmental Science and Pollution Research International 25(19):19187-19195(2018)

Composite surface soil samples were collected at 0, 25, and 50 cm from the base of 12 utility poles on the Kenai National Wildlife Refuge in Alaska, to assess the extent to which pentachlorophenol (PCP), polychlorinated dibenzo-p-dioxins, and polychlorinated dibenzo furans might have leached from PCP-treated poles. Each of six pairs of utility poles consisted of a pole manufactured in 1959 or 1963 and a pole manufactured within the past 20 years. A suitable background soil was sampled from each poles' vicinity. Old poles had greater concentrations of 2,3,7,8-TCDD equivalents (TEQs) near the pole base and at 25 cm than did newer poles. Surface soil levels of PCP and TCDD-TEQs exceeded both human health and ecological risk-based screening levels, suggesting that millions of similarly treated utility poles in North America might be point sources of PCP and dioxins/furans to soil. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6061508/

RECENT DEVELOPMENTS IN ALTERNATIVES FOR PFAS GROUNDWATER TREATMENT, INCLUDING AN EMERGING ON-SITE DESTRUCTION TECHNOLOGY
Thomas, S., N. Hagelin, and D. Woodward.
2018 RPIC Federal Contaminated Sites National Workshop, 13-15 June, Toronto, ON. 29 slides, 2018

Remediation technologies are needed that can contain and treat poly- and perfluoroalkyl substances (PFASs) at the source. Granular activated carbon (GAC) has generally been considered the best available technology for PFOS/PFOA treatment, but potential concerns include frequency of GAC change-outs, short-chain removal performance, and co-contaminant loading and preferential removal. Ion-exchange (IX) resins have shown promise for treating a broad suite of PFASs. These synthetic media can be regenerated on site and reused. Regenerant solutions can then be distilled on site to recycle/reuse the regenerant, yielding a concentrated PFAS residue. For on-site destruction of PFASs and a broad suite of co-contaminants in this concentrated residue, an enhanced-contact low-energy plasma reactor technology is being developed at Clarkson University. Several projects are described that use IX resins to address PFASs, ranging from internally and externally funded R&D projects to one of the first large-scale pump-and-treat systems employing IX resin and on-site regeneration at a large DoD facility. Results from bench-scale plasma destruction tests are also presented.
http://rpic-ibic.ca/images/2018_FCSW_/Presentations/2_-_120_-_Hagelin_ENG_final-rev1.pdf

USING CALCINATION REMEDIATION TO STABILIZE HEAVY METALS AND SIMULTANEOUSLY REMOVE POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL
Wang, P., X. Hu, Q. He, M.G. Waigi, J. Wang, and W. Ling.
International Journal of Environmental Research and Public Health 15(8):1731(2018)

A novel investigation was conducted utilizing calcination technique to stabilize heavy metals and simultaneously remove PAHs in soil. Calcination temperature (300-700°C) was observed to play a dominant role in heavy metal stabilization and PAH removal in soils, whereas calcination time (0.5-8 h) had no significant effect on these contaminants during calcination at different temperatures. An optimal calcination condition for Zn, Cu, naphthalene, and fluoranthene is suggested at 700°C for 0.5 h to achieve the corresponding stabilization or removal efficiency values of 96.95%, 98.41%, 98.49%, and 98.04%, respectively.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6121654/

TERRESTRIAL PERMAFROST AREAS: THE STATE OF KNOWLEDGE ON TRANSPORT, FATE AND DEGRADATION OF HALOGENATED ORGANIC COMPOUNDS
Ask, A. and H. Routti.
Norwegian Polar Institute (NPI), Kortrapport/Brief Report no. 043, 23 pp, 2017

Halogenated organic contaminants, such as organochlorinated pesticides, PCBs, brominated flame retardants, and per- and polyfluoroalkyl substances, are the focus of this report. Literature on sources, fate, and degradation of these contaminants in Arctic permafrost areas is summarized.
http://hdl.handle.net/11250/2434509

REMEDIATION OF POLYCHLORINATED BIPHENYLS (PCBS) IN CONTAMINATED SOILS AND SEDIMENT: STATE OF KNOWLEDGE AND PERSPECTIVES
Jing, R., S. Fusi, and B.V. Kjellerup.
Frontiers in Environmental Science 6:Article 79(2018)

This review summarizes remediation solutions frequently implemented for PCBs: microbial degradation, phytoremediation, dehalogenation by chemical reagent, and removal by activated carbon. Recent studies of other technologies investigated for PCBs remediation have included supercritical water oxidation, ultrasonic radiation, bimetallic systems, nanoscale zero-valent iron-based reductive dehalogenation and biofilm-covered activated carbon, and electrokinetic remediation. The advantages and disadvantages of each general treatment strategy and promising technology for PCBs remediation are compared. The potential of using combined technologies for PCB remediation is also discussed. https://www.frontiersin.org/articles/10.3389/fenvs.2018.00079/full

SCIENCE SUPPORT FOR EVALUATING NATURAL RECOVERY OF POLYCHLORINATED BIPHENYL CONCENTRATIONS IN FISH FROM CRAB ORCHARD LAKE, CRAB ORCHARD NATIONAL WILDLIFE REFUGE, ILLINOIS
Kunz, B.K., J.E. Hinck, R.D. Calfee, G.L. Linder, and E.E. Little.
U.S. Geological Survey Open-File Report 2018-1006, 30 pp, 2018

PCB contamination at Crab Orchard National Wildlife Refuge was identified in the 1970s, and a PCB-based fish-consumption advisory has been in effect since 1988 for Crab Orchard Lake. Some of the most contaminated areas of the refuge were actively remediated, and natural ecosystem recovery processes are expected to provide for further reduction of residual PCB concentrations in the lake. To understand environmental drivers of recent (2017) PCB residues in fish tissue and patterns in PCB residues through time, a project is planned in two phases. Task 1, reported here, includes a review of existing literature and a brief overview of environmental and biochemical/ physiological processes that drive PCB residues in fish tissue. The review includes a brief, scientifically based explanation of approaches used to establish fish-consumption advisories. The plan for Task 2 calls for compiling and summarizing existing data on PCB residues in fish tissue samples from Crab Orchard Lake, and then comparing Crab Orchard data with fish data from other Midwestern lakes.
https://pubs.er.usgs.gov/publication/ofr20181006

ADVANCING THE USE OF PASSIVE SAMPLING IN RISK ASSESSMENT AND MANAGEMENT OF SEDIMENTS CONTAMINATED WITH HYDROPHOBIC ORGANIC CHEMICALS: RESULTS OF AN INTERNATIONAL EX SITU PASSIVE SAMPLING INTERLABORATORY COMPARISON
Jonker, M.T.O., S.A. van der Heijden, D. Adelman, J.N. Apell, R.M. Burgess, Y. Choi, et al.
Environmental Science & Technology 52:3574-3582(2018)

The main objectives of the interlaboratory comparison project were to map the state of the science in passive sediment sampling, identify sources of variability, provide recommendations and practical guidance for standardized passive sampling, and advance the use of passive sampling in regulatory decision-making by increasing confidence in the use of the technique. Performed by a consortium of 11 laboratories, the experiments encompassed 14 passive sampling formats on 3 sediments for 25 target chemicals (PAHs and PCBs). The resulting overall interlaboratory variability was large (a factor of ~10), but standardization of methods halved this variability. The remaining variability was due primarily to factors not related to passive sampling itself, i.e., sediment heterogeneity and analytical chemistry. Excluding the latter source of variability, results showed that passive sampling results can have a high precision and a very low intermethod variability (< factor of 1.7). https://pubs.acs.org/doi/pdfplus/10.1021/acs.est.7b05752

REMOVAL OF PCDD/FS, PCP AND MERCURY FROM SEDIMENTS: THERMAL OXIDATION VERSUS PYROLYSIS
Chang, M.-B. Chang, Y.-C. Hsu, and S.-H. Chang.
Chemosphere 207:10-17(2018)

A continuous pilot-scale thermal treatment system equipped with effective air pollution control devices was used for simultaneous remediation of sediments contaminated with PCDD/Fs, PCP, and Hg. The removal efficiencies of these three pollutants in sediments collected from (1) a seawater pond and (2) a river, respectively, were evaluated via thermal treatment processes. PAHs and chlorobenzenes (CBz) formed during thermal oxidation and pyrolysis were also analyzed to gain a better understanding of chlorinated organics behavior. Results indicated that low-molecular-weight PAHs were closely related to the formation of CBz, PCDD/Fs, and CPs, while low chlorinated PCDD/Fs and CBz predominated in flue gas with thermal oxidation. Particulate matter concentration was higher in thermal oxidation than pyrolysis due to the higher air flow rate of thermal oxidation, which might bring more particles out of the furnace and have a greater potential to form PCDD/Fs within air pollution control devices. Pyrolysis performed more effectively than thermal oxidation for removal of total PCDD/Fs and thus was more suitable for remediating the contaminated sediment. PCDD/Fs, PCP, and Hg removal efficiencies in sediments using pyrolysis increased with increasing operating temperature and retention time. Overall, residual concentrations of PCDD/Fs and PCP in river sediment were higher than those in seawater-pond sediment; significant formation of tar was observed due to higher organic matter content in river sediment.

CAPPING OF MARINE SEDIMENTS WITH VALUABLE INDUSTRIAL BY-PRODUCTS: EVALUATION OF INORGANIC POLLUTANTS IMMOBILIZATION
Taneez, M., C. Hurel, F. Mady, and P. Francour.
Environmental Pollution 239:714-721(2018)

Low-cost industrial by-products (bauxaline, steel slag, and a mixture of the two products) were applied as capping agents to inhibit mobilization of metals from contaminated sediments. Lab experiments in aquariums were performed to evaluate capping agent effects on Cd, Zn, As, and Cr mobility from an artificially contaminated marine sediment. Without capping, all the contaminants were constantly released, though release did not exceed 31% of the initial amount of pollutant. Capping sediment with steel slag, bauxaline, and their mixture totally captured Cd, Zn, and As. In the case of Cr, however, only steel slag actively blocked its release. A kinetic model was developed to model As and Cr release, with and without capping. The release times for Cr and As from the sediment were close to 6 days. In the presence of capping agents, the capture time for Cr was 57 days for steel slag and 7 days for bauxaline. Steel slag was considered the most effective capping agent. https://nephi.unice.fr/ftp/users/ecomers/2018/2018%20Taneez%20et%20al%20Capping.pdf

IN SITU BENTHIC FLOW-THROUGH CHAMBERS TO DETERMINE SEDIMENT-TO-WATER FLUXES OF LEGACY HYDROPHOBIC ORGANIC CONTAMINANTS
Mustajarvi, L., E. Eek, G. Cornelissen, A.-K. Eriksson-Wiklund, E. Undeman, and A. Sobek.
Environmental Pollution 231(1):854-862(2017)

Contaminated sediments can release hydrophobic organic contaminants (HOCs) to the water column. In situ assessment of HOC sediment-to-water flux is currently done with closed benthic flux chambers, which have a sampling time exceeding one month. The effect of bioturbation on the sediment-to-water release of HOCs is largely ignored. A novel benthic flux chamber is presented that not only measures sediment-to-water flux of legacy HOCs within days but also includes the effect of bioturbation by continuous pumping of water through the chamber. This design allows for sediment-to-water flux measurements under more natural conditions. In a field test in a contaminated Baltic Sea bay, measured fluxes were 62-2,300 ng/m^2/d for individual PAHs and 5.5-150 ng/m^2/d for PCBs. These fluxes were 3-23 times (PAHs) and 12-74 times (PCBs) higher than fluxes measured with closed benthic chambers deployed in parallel at the same location. The observed differences in HOC flux between the two designs are partly attributed to the effect of bioturbation. *This paper is **Open Access** at* https://www.sciencedirect.com/science/article/pii/S0269749117303299. *See additional information in L. Mustajarvi's thesis at* http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1160220&dswid=-5608.

General News

BEST AVAILABLE TECHNIQUES (BAT) REFERENCE DOCUMENT FOR WASTE TREATMENT
Pinasseau, A., B. Zerger, J. Roth, M. Canova, and S. Roudier.
European Commission Industrial Emissions Directive 2010/75/EU, 851 pp, 2018

In the European Union, waste management without resorting to landfilling is an essential part of the transition to a circular economy and is based on a waste hierarchy, which sets the following priority order when shaping waste policy and managing waste at the operational level: prevention, preparing for reuse, recycling, recovery, and disposal as the least preferred option (landfilling and incineration without energy recovery fall outside the scope of this document). Secondary products are inherent to any industrial process, however, and normally cannot be avoided. The reason for treating waste often depends on the type of waste and the nature of its subsequent fate. Some waste treatments and installations are multipurpose. In this document, the basic reasons for treating waste are to reduce the hazardous nature of the waste; separate the waste into its individual components, some or all of which can then be put to further use/treatment; reduce the amount of waste that has to be sent for final disposal; and transform the waste into a useful material.
http://eippcb.jrc.ec.europa.eu/reference/BREF/WT/JRC113018_WTbref.pdf

PROCEEDINGS OF THE GLOBAL SYMPOSIUM ON SOIL POLLUTION, 2-4 MAY 2018, ROME, ITALY
Food and Agriculture Organization of the United Nations (FAO), Rome. 977 pp, 2018

The Proceedings of GSOP18 contains the abstracts of all scientific presentations made during the symposium. The 100 oral and 50 poster presentations formed the core of this event, triggering fruitful discussions on the state-of-science of soil pollution in different soils of the world.
http://www.fao.org/3/CA1087EN/ca1087en.pdf

TOWARD A SUPERIOR FUTURE: ADVANCING SCIENCE FOR A SUSTAINABLE ENVIRONMENT, SETAC 38TH ANNUAL MEETING, 12-16 NOVEMBER 2017, MINNEAPOLIS, MN — BOOK OF ABSTRACTS
Society of Environmental Toxicology and Chemistry: North America. 424 pp, 2017

This book contains the abstracts of the presentations for the platform and poster sessions of the Society of Environmental Toxicology and Chemistry's 38th Annual Meeting. SETAC aims to promote systematic application of all relevant scientific disciplines to the evaluation of chemical hazards as well as research, education, and training in the environmental sciences. The event provided a forum to encourage participation in the scientific interpretation of issues concerned with hazard assessment and risk analysis and to support the development of ecologically acceptable practices and principles.
https://www.setac.org/resource/resmgr/abstract_books/SETAC-Minn-abstract-book.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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