Technology Innovation News Survey

Entries for November 1-15, 2020

Market/Commercialization Information

TECHNICAL ASSISTANCE TO BROWNFIELDS COMMUNITIES
Environmental Protection Agency, Funding Opportunity EPA-OLEM-OBLR-20-08, 2020

U.S. EPA announces the availability of funds and solicits applications from eligible entities (including eligible non-profit organizations) to provide technical assistance to communities on brownfield issues. See details at https://www.epa.gov/grants/technical-assistance-brownfields-communities-0. EPA anticipates award of up to 11 cooperative agreements out of total estimated program funding of $11M. The closing date for applications is December 22, 2020. https://www.grants.gov/web/grants/view-opportunity.html?oppId=329720.

EMERGENCY AND RAPID RESPONSE SERVICES V (ERRS)
U.S. Environmental Protection Agency, Washington, DC.
Contract Opportunities at Beta.SAM, Solicitation 68HE0421R0004

This is a total small business set-aside under NAICS code 562910 for Emergency and Rapid Response Services V in EPA Regions 4, 5, and 6. Contractor shall take any actions to provide response support services for emergency, time-critical, and non-time-critical removal actions as well as remedial actions required to mitigate or eliminate any hazard or damage to human health and the environment resulting from (1) release or threat of a release of oil, petroleum products, hazardous substances, pollutants or contaminants into the environment; (2) threat of fire and explosion; (3) incidents involving weapons of mass destruction, nuclear/ radioactive-biological-chemical threats and/or terrorist acts; or (4) natural or man-made disasters. See details on FedConnect at https://www.fedconnect.net/FedConnect/?doc=68HE0421R0004&agency=EPA. Period of performance is a 3-year base and one 2-year option. Offers are due by 4:00 PM ET on January 4, 2021. https://beta.sam.gov/opp/e1081dee1e784a358472d122eab529fc/view.

ENGINEERING & CONSTRUCTION MANAGEMENT SERVICES
U.S. Army Corps of Engineers, Huntington District, Huntington, WV.
Contract Opportunities at Beta.SAM, Solicitation W9123721R0002

This request for submittal of SF-330s is open to all businesses regardless of size under NAICS code 541330, small business size standard $16.5M. A-E firms will be selected for price negotiations based on demonstrated competence and qualifications for the required work, which will consist of engineering and construction services to support the development of various projects within or assigned to the Huntington District, U.S. Army Corps of Engineers, Great Lakes and Ohio River Division and work for others through the Department of Energy (DOE), international and interagency support customers, and other federal agencies. The majority of the work under this contract will be performed for DOE field/project offices as well as National Science Foundation, Department of Homeland Security, and possibly other federal agencies in need of specialized nuclear engineering and construction services. The work and services to be accomplished will consist of providing, on an individual task-order basis, highly technical and specialized nuclear engineering; environmental engineering; design reviews; engineering support during construction; plan and specification reviews; preparation of computer-aided design and drafting drawing reviews; construction management; and technical review of decontamination, decommissioning and demolition of nuclear facilities to include nuclear quality assurance, environmental remediation, and project controls. Contractor shall have the capacity to field three to five teams consisting of 10 to 20 individuals at any given time. Team members shall be fully trained in engineering and construction functions associated with the design and construction of larger scale civil works and environmental and DOE cleanup and construction projects. One indefinite-delivery contract will be negotiated and awarded with a one-year base and four one-year options, not to exceed $90M over the life of the contract. SF-330 packages are due by 3:00 PM ET on January 6, 2020. Award is anticipated in February 2021. https://beta.sam.gov/opp/4340f5b8697e4f7393b6fb858201edc/view.

ENVIRONMENTAL CONSULTING SERVICES
U.S. Army Joint Munitions Command, Rock Island, IL.
Contract Opportunities at Beta.SAM, Solicitation W52PIJ21SENV1, 2020

The U.S. Army Contracting Command - Rock Island on behalf of the Product Director for Demilitarization is conducting market research seeking potential qualified, experienced business sources that are capable of providing environmental consulting services (NAICS code 541620) at 12 Army Depot facilities. The purpose of this synopsis is to gain knowledge of the interest, capabilities, and qualifications of 8(a), HUBZone, service-disabled veteran-owned, or woman-owned small businesses. The required services are to provide technical consultative support regarding Clean Air Act (CAA) Maximum Achievable Control Technology Rule requirements for thermal treatment systems, CAA/RCRA regulatory requirements, and other regulations/proposed regulations that could have the potential to impact thermal treatment systems as well as to analyze alternative thermal treatment demilitarization technologies and perform depot audits of thermal treatment systems at Army Depot locations. This notice is for planning purposes only and does not constitute an RFP. Capability statements are due by 12:00 noon CT on January 6, 2021. https://beta.sam.gov/opp/1f99759ee8854d2ebf5b8bee0ffb2bba/view.

DEPLOYMENT OF INNOVATIVE WATER TECHNOLOGIES FOR VERY SMALL DRINKING WATER SYSTEMS, AREAS SERVED BY PRIVATE WELLS AND SOURCE WATERS
U.S. Environmental Protection Agency, Funding Opportunity EPA-G2021-ORD-B1, 2020

America's Water Infrastructure Act of 2018 authorizes a grant program for the purpose of accelerating the development and deployment of innovative water technologies that address pressing drinking water supply, quality, treatment, or security challenges of public water systems, areas served by private wells, or source waters. U.S. EPA's Office of Research and Development is seeking applications to facilitate multi-state cooperation and accelerate the development and deployment of innovative water technologies that address pressing drinking water supply, quality, treatment, or security challenges of very small public water systems (serving 500 persons or fewer), areas served by private wells, or source waters. See more at https://www.epa.gov/research-grants/deployment-innovative-water-technologies-very-small-drinking-water-systems-areas-0. A single award of up to $1M is contemplated. The closing date for applications is January 12, 2021. https://www.grants.gov/web/grants/view-opportunity.html?oppId=329846.

Cleanup News

HIGHLY COMPLEX IN SITU THERMAL REMEDIATIONS
Soos, L. | Design and Construction Issues at Hazardous Waste Sites Virtual Meeting, 26-28 October, 26 slides, 2020

This presentation focuses on the technical complexities of constructing and operating full-scale thermal remedies at a site in New Jersey and the Brandywine DRMO Superfund site. It describes the various tools available for complex in situ thermal remediation implementations, shares lessons learned, and provides remediation results.
Slides: https://clu-in.org/conf/tio/DCHWS11/slides/1Slide_Presentation_for_Lauren_Soos_TRS_Group,_Inc..pdf
Longer abstract: https://clu-in.org/conf/tio/DCHWS11/2020_DCHWS_Highley_Complex_In_Situ_Thermal_Remediations.pdf
See the 2018 Record of Decision for the Brandywine DRMO Superfund site for more information on the ERH system: https://semspub.epa.gov/work/03/2255983.pdf

CHALLENGES ENCOUNTERED ON HEAVILY CONTAMINATED THERMAL NAPL SITES
Griepke, S. | Design and Construction Issues at Hazardous Waste Sites Virtual Meeting, 26-28 October, 22 slides, 2020

Citing case studies, this presentation focuses on overcoming some common operational issues during full-scale thermal NAPL projects. The presentation includes governing removal mechanisms, common field issues encountered in the subsurface, process system components at high NAPL mass sites, design considerations and lessons learned for high-mass NAPL source zones, and data and lessons learned from laboratory treatability studies and full-scale remedies.
Slides: https://clu-in.org/conf/tio/DCHWS11/slides/2Slide_Presentation_for_Steffen_Griepke_-Cascade_Thermal.pdf
Longer abstract: https://clu-in.org/conf/tio/DCHWS11/Final-Challenges-Encountered-on-Heavily-Contaminated-Thermal-NAPL-sites-2-sg.pdf.

CHALLENGES OF THERMAL REMEDIATION AT TWO WASTE OIL SUPERFUND SITES
Davis, E. | Design and Construction Issues at Hazardous Waste Sites Virtual Meeting, 26-28 October, 22 slides, 2020

Thermal remediation was the chosen LNAPL remedy at both the Solvent Recovery Services of New England (SRSNE) and Beede Waste Oil Superfund sites. While similarities existed in the wastes to be recovered at the two sites, site characteristic differences led to different thermal approaches. The presentation describes each site's salient features, the chosen remedial technologies (thermal conductive heating at SRSNE and steam enhanced extraction at Beede), the challenges encountered, and how these challenges were successfully overcome.
Slides: https://clu-in.org/conf/tio/DCHWS11/slides/3Slide_Presentation_for_Eva_Davis,_EPA_Office_of_Research_and_Development.pdf
Longer abstract: https://clu-in.org/conf/tio/DCHWS11/Challenges_of_Thermal_Remediation_at_Two_Waste_Oil_Sites_3-ed.pdf.
See fact sheet for the Beede Waste Oil Superfund site project: https://www.cascade-env.com/media/2667/phase-one-see-at-the-beede-waste-oil-superfund-site-plaistow-nh.pdf *See fact sheet for the SRSNE site project:* http://terratherm.com/pdf/SRSNE-SouthingtonCT_CaseStudy.pdf

REMEDIAL ACTION WORK PLAN FOR THE B.F. GOODRICH SUPERFUND SITE, CALVERT CITY, MARSHALL COUNTY, KENTUCKY
Battelle on behalf of the Goodrich Corporation, PolyOne Corporation, and Westlake Vinyls, Inc., 56 pp, 2020

Chemical manufacturing at the B.F. Goodrich site contaminated 1-3.5 million yd^3 of soil with organic NAPL, primarily as ethylene dichloride (EDC), and ~450 yd^3 of soil with mercury NAPL, both of which are dissolving into groundwater. A plant-wide groundwater extraction and treatment system was installed but has not contained all contamination. As a result, groundwater contamination migrated to the Tennessee River. To prevent migration and further exposure, a barrier wall using a combination of sheet-piling, soil bentonite backfill, jet-grout, or other suitable material will be installed around the perimeter of the contaminated soil and groundwater. After the barrier contains the contamination, elevated groundwater concentrations beneath the Tennessee River will be reduced to drinking water standards via natural attenuation. If natural attenuation does not reduce contaminant levels after five years, EPA may supplement it with offshore groundwater extraction and treatment. Other remedial efforts will include lining the Outfall 004 Ditch, closing Pond 1A and 2, extracting NAPL within the barrier wall to the extent practicable, dredging and backfilling the Barge Slip, and pumping or extracting offshore NAPL. https://www.justice.gov/enrd/consent-decree/file/1319691/download.

SOUTH STATE STREET MGP SITE BELLINGHAM, WASHINGTON FINAL CLEANUP ACTION PLAN
Washington State Department of Ecology Toxics Cleanup Program, 32 pp, 2020

Historical operations at the South State Street site resulted in cPAH- naphthalene-, benzene-, and cyanide-contaminated groundwater in the site's upland unit and cPAH-contaminated sediment in the site's marine unit. Groundwater remediation will consist of enhanced bioremediation to remediate areas of higher contaminant concentrations to levels that can be further degraded by natural attenuation and monitored natural attenuation of less-contaminated units. Enhanced and monitored natural recovery (ENR and MNR) will be used in portions of the marine unit where surface cPAHs sediment concentrations are low and where clean sediment deposition is anticipated to achieve cleanup levels in a reasonable timeframe. Natural recovery efforts in the ENR and MNR areas are expected to achieve cPAH bioaccumulation cleanup levels within 10 years. Other remedial actions will include an upland permeable vegetated soil cap, removing a remnant gas holder, and sediment capping. https://apps.ecology.wa.gov/gsp/DocViewer.ashx?did=93990.

Demonstrations / Feasibility Studies

TREATMENT OF TANNERY WASTEWATER IN A PILOT SCALE HYBRID CONSTRUCTED WETLAND SYSTEM IN AREQUIPA, PERU
Zapana, J.S.P., D.S. Aran, E.F. Bocardo and C.A. Harguinteguy.
International Journal of Environmental Science and Technology 17:4419-4430(2020)

The performance of a pilot-scale hybrid constructed wetland system consisting of horizontal subsurface flow and free water surface flow was evaluated to treat tannery wastewater. The pilot measured the hybrid wetland's pollutant removal efficiency, chromium bioaccumulation, and growth and survival parameters of *Isolepis cernua* and *Nasturtium aquaticum*. Removal efficiencies were 98% for 5-day biological oxygen demand, 97% for chemical oxygen demand, 97% for total suspended solids, 33% for total dissolved solids, and 98% for chromium after treatment. Macrophytes had low chromium bioconcentration and translocation levels, with growth and survival, especially of *Isolepis cernua*, revealing a high capacity to adapt to the variability and possible toxic effects of tannery wastewater.

A NOVEL PILOT AND FULL-SCALE CONSTRUCTED WETLAND STUDY FOR GLASS INDUSTRY WASTEWATER TREATMENT
Gholipour, A., H. Zahabi, and A.I. Stefanakis. | Chemosphere 247:125966(2020)

A four-month pilot test was conducted on a system consisting of a settling tank and horizontal sub-surface flow constructed wetland to treat wastewater from glass manufacturing. The system was effective at reaching high removal rates of 5-day biological oxygen demand (90%), chemical oxygen demand (90%), total suspended solids (99%), total nitrogen (>90%), and total phosphorus (>90%). The system's high efficiency allowed for the recycling and reuse of treated effluent, reducing the freshwater consumption in the glass industry, and related operational costs. Results were used to build a full-scale system to treat 10 m^3/day.

IN SITU PILOT APPLICATION OF NZVI EMBEDDED IN ACTIVATED CARBON FOR REMEDIATION OF CHLORINATED ETHENE-CONTAMINATED GROUNDWATER: EFFECT ON MICROBIAL COMMUNITIES
Czinnerova, M., N.H.A. Nguyen, J. Nemecek, K. Mackenzie, C. Boothman, J. Lloyd, et al.
Environmental Sciences Europe 32:154 (2020)

A novel material consisting of colloidal activated carbon with embedded nano zero-valent iron clusters was developed to overcome long-term reactivity and subsurface transport limitations of nZVI alone to remediate chlorinated ethenes (CEs). While this pilot study failed to provide a sustainable effect on CE contamination, it provided valuable insights into induced hydrogeochemical and microbial processes that could help in designing full-scale applications. *This article is* ***Open Access*** *at* https://enveurope.springeropen.com/articles/10.1186/s12302-020-00434-2.

PILOT BIOREMEDIATION OF CONTAMINATED SOILS BY HYDROCARBONS, FROM AN ELECTRICITY PRODUCTION AND DISTRIBUTION SITE IN OUAGADOUGOU, BURKINA FASO
Ouedraogo, W.P., C.H. Otoidobiga, C.A.T. Ouattara, A.S. Ouattara, and A.S. Traore.
Scientific Research and Essays 15(4):69-77(2020)

An eight-month pilot was conducted to monitor biotreatment of hydrocarbon-contaminated soil in an "off situ" treatment system by monitoring total petroleum hydrocarbons and physicochemical parameters and counting the endogenous microorganisms involved in biodegradation. Polluted soil was excavated from the contaminated site and conveyed to another site accommodating a structure specialized for biotreatment. The soil was pretreated to remove large debris and homogenize the soil. It was placed in one of two heaps (heap 1 and heap 2) for treatment, receiving substrates, periodic watering, and reversal of the medium. A total oil reduction rate of 62.32% was observed for heap 1 and 67.92% for heap 2. The temperature, pH, and humidity of the two heaps varied. Microbiological analysis showed aerobic microflora proliferation, including bacteria and molds, in the two soil piles.
https://academicjournals.org/journal/SRE/article-full-text-pdf/EAC369E65468.

A FOUR-YEAR PHYTOREMEDIATION TRIAL TO DECONTAMINATE SOIL POLLUTED BY WOOD PRESERVATIVES: PHYTOEXTRACTION OF ARSENIC, CHROMIUM, COPPER, DIOXINS AND FURANS
Yanitch, A., H. Kadri, C. Frenette-Dussault, S. Joly, F.E. Pitre, and M. Labrecque.
International Journal of Phytoremediation 22(14): 1505-1514

A four-year field phytoremediation trial utilizing willow, fescue, alfalfa, and Indian mustard was performed in southern Quebec on a pentachlorophenol- (PCP) and chromated copper arsenate- (CCA) contaminated site. The test assessed the plants' potential to tolerate and translocate CCA and PCP residues in aerial tissues, investigated the phytoextraction possibility of dioxins and furans, and tested the effect of nitrogen fertilizer on phytoremediation performance. Nitrogen fertilization increased the chlorophyll content of plants but did not result in greater plant biomass. Plants grown in the presence of PCP/CCA residues translocated and concentrated trace elements as well as dioxins and furans in their aerial tissues, suggesting that plants grown on PCP-polluted sites might contain dioxins and furans. Therefore, the plants should be treated as contaminated.

PILOT SCALE IN-SITU REMEDIATION OF DISSOLVED METALS PLUME (CASE STUDY)
Gossen, J. | REMTECH 2020: The Remediation Technologies Symposium, 14-15 October, Virtual Meeting, 29 slides, 2020

Historical operations of a former industrial facility contaminated a site with metals, creating a copper plume in groundwater that reached a nearby river. The remedial strategy uses iron oxyhydroxide/hydrous ferric oxide (HFO) minerals to

decrease dissolved metal concentrations. Ferrous sulfate heptahydrate was injected to increase HFO concentrations. Three well transects were installed with different target HFO concentrations (3,750, 5,000, and 6,250 mg-Fe/kg-soil) to evaluate HFO concentration effects on metal adsorption. Groundwater sampling indicated a decrease of up to 99% in dissolved metals concentrations, with an average of 81% across the well network. Increases in HFO in confirmatory soil samples indicated that HFO precipitated over a larger volume surrounding the injection wells than anticipated. Pilot-scale injection results informed the methodology for a full-scale project, scheduled for completion at the end of 2020.
Slides: https://www.esaa.org/wp-content/uploads/2020/11/RT2020-Gossen.pdf
Longer abstract: https://www.esaa.org/wp-content/uploads/2020/10/30-RT-2020-Gossen.pdf

Research

MEMBRANE-BASED TECHNOLOGIES FOR THE PRODUCTION OF HIGH-QUALITY WATER FROM CONTAMINATED SOURCES: FROM LAB EXPERIMENTS TO FULL-SCALE SYSTEM DESIGN
Giagnorio, M., Ph.D. thesis, Polytechnic University of Turin, Turin, Italy, 130 pp, 2020

Nanofiltration (NF) to produce drinking water from a chromium-contaminated source and forward osmosis-nanofiltration (FO-NF) to reclaim high-quality water from brackish groundwater and wastewater were tested. Results were used to implement and evaluate the performance at a larger scale and through system-scale modeling to identify the best operating conditions design full-scale systems.
https://iris.polito.it/retrieve/handle/11583/2829687/368486/Phd_thesis_mattia_giagnorio_final_version.pdf

ASSESSMENT OF DIFFERENT MULTIPURPOSE TREE SPECIES FOR PHYTOEXTRACTION OF LEAD FROM LEAD-CONTAMINATED SOILS
Singh, B., B. Kaur, and D. Singh. | Bioremediation Journal 24(4): 215-230(2020)

The potential of *Eucalyptus tereticornis* Sm. (eucalyptus), *Leucaena leucocephala* Lam. de Wit (subabul), *Melia azedarach* L. (dhrek), and *Dalbergia sissoo* Roxb. (shisham) to tolerate and extract Pb from soil at six applied rates (0, 30, 60, 120, 180, and 240 mg Pb/kg soil) was assessed in pot experiments over 18 months. Subabul was deemed the most effective for phytoremediation of Pb-contaminated sites due to its greater biomass and higher Pb extraction from the soil than the other tree species.

ANAEROBIC DEHALOGENATION BY REDUCED AQUEOUS BIOCHARS
Lokesh, S., J. Kim, Y. Zhou, D. Wu, B. Pan, X. Wang, S. Behrens, C.-H. Huang, and Y. Yang.
Environmental Science & Technology 54(23):15142-15150(2020)

A study was conducted to investigate the dehalogenation of triclosan (TCS) by aqueous biochars (a-BCs). Results showcased that a-BCs can reductively degrade organohalogens with potential applications for wastewater treatment and groundwater remediation. While TCS was used as a model compound in this study, a-BC-based degradation can be likely applied to a range of redox-sensitive trace organic compounds.

BIOREMEDIATION OF CD-SPIKED SOIL USING EARTHWORMS (EISENIA FETIDA): ENHANCEMENT WITH BIOCHAR AND *BACILLUS MEGATHERIUM* APPLICATION
Xiao, R., X. Liu, A. Ali, A. Chen, M. Zhang, R. Li, H. Chang, and Z. Zhang.
Chemosphere 264 Part 2:128517(2020)

The influence of biochar and *Bacillus megatherium* was evaluated on Cd removal from artificially contaminated soils using earthworms over 35 days. Within the remediation period, >30% of Cd was removed by earthworms from the contaminated soil (Cd at ~2.5 mg/kg), and both additives facilitated Cd removal. Extractable Cd contents were reduced by >22%. Accumulated Cd decreased in the order of earthworm+biochar (T3) > earthworm+ *B. megatherium* (T4) > earthworm alone (T2). Soils became more fertile and demonstrated higher enzyme activities after remediation.

LONG-TERM EFFECTS OF THIN LAYER CAPPING IN THE GRENLAND FJORDS, NORWAY: REDUCED UPTAKE OF DIOXINS IN PASSIVE SAMPLERS AND SEDIMENT-DWELLING ORGANISMS
Schaanning, M.T., B. Beylich, J.S. Gunnarsson, and E. Eek.
Chemosphere 264 Part 2:128544(2020)

Following thin-layer capping to reduce spreading of dioxins in fjord sediments, tests were carried out to determine the effects on benthic communities and dioxin bioavailability. From 2009-2018, four surveys measured uptake of dioxins and furans using passive samplers and two sediment-dwelling species exposed in boxcores collected from test plots. Sediment profile images and analyses indicated that the thin cap layers became buried beneath several centimeters of sediments resuspended from adjacent bottoms and deposited on the test plots after capping. Cap layers with dredged clay or crushed limestone had only a short-term positive effect on the benthic community 1-4 years after capping. Despite recontamination, cap layers with clay and activated carbon (AC) had significant long-term effects, showing 54-61% reduced uptake of dioxins nine years after capping with AC.

CHARACTERISTICS OF ORGANIC CARBON METABOLISM AND BIOREMEDIATION OF PETROLEUM-CONTAMINATED SOIL BY A MESOPHILIC AEROBIC BIOPILE SYSTEM
Zhang, K., S. Wang, P. Guo, and S. Guo. | Chemosphere 264 Part 2:128521(2020)

A mesophilic aerobic biopile technology was tested to improve the bioremediation efficiency on petroleum-contaminated soil. Bioavailable organic carbon (BAC) consumption was one of the most important factors regulating microbial metabolism. Optimal conditions of 40°C with 3 h-on and1 h-off aeration maximized BAC utilization, promoted petroleum degradation, and stabilized the microbial abundance and community composition. Accumulating aliphatic acids affected microbial activity, which limited the efficiency of petroleum degradation to a certain extent.

ELECTRO-ASSISTED AUTOHYDROGENOTROPHIC REDUCTION OF PERCHLORATE AND MICROBIAL COMMUNITY IN A DUAL-CHAMBER BIOFILM-ELECTRODE REACTOR
He, L., Q. Yang, Y. Zhong, F. Yao, B. Wu, K. Hou, Z. Pi, D. Wang, and X. Li.
Chemosphere 264 Part 2:128548(2020)

A dual-chamber biofilm-electrode reactor (BER) in which the microbial community was inoculated from natural sediments was used to investigate electro-assist autohydrogenotrophic perchlorate reduction. The cathode configuration was designed to avoid the effect of extreme pH and direct electron transfer on perchlorate reduction. At a concentration of 10 mg/L, perchlorate removal reached 98.16% at a hydraulic retention time of 48 h. Perchlorate-reducing bacteria were enriched and became ascendant with increasing influent concentrations.

PERFORMANCE OF NITROBENZENE AND ITS INTERMEDIATE ANILINE REMOVAL BY CONSTRUCTED WETLANDS COUPLED WITH THE MICRO-ELECTRIC FIELD
Wang, H., L. Zhang, Y. Tian, Y. Jia, G. Bo, L. Luo, L. Liu, G. Shi, and F. Li.
Chemosphere 264 Part 1:128456(2020)

The ability of constructed wetlands coupled with micro-electric field (CW-MEF) technology to degrade nitrobenzene- and aniline-contaminated wastewater was studied. With increasing nitrobenzene influent concentrations, the anode's removal rate remained above 86%, but chemical oxygen demand degradation decreased. The power generation capacity was different in different stages. High-throughput sequencing analysis showed the A1 sludge layer contained 36% of thick-walled bacteria and 20% of *Bacteroides*, the A2 layer contained about 20% of *Campylobacter* green, and the A3 layer contained 10% of green *Campylobacter*, *Pachyphyte*, and *Bacteroides*.

BIOSURFACTANT MEDIATED BIOELECTROKINETIC REMEDIATION OF DIESEL CONTAMINATED ENVIRONMENT
Vaishnavi, J., S. Devanesan, M.S. AlSalhi, A. Rajasekar, A. Selvi, P. Srinivasan, et al.
Chemosphere 264 Part 1:128377(2020)

Electrokinetic (EK) remediation was integrated with bioremediation (bioelectrokinetic [BEK]) of diesel hydrocarbons using *Staphylococcus epidermidis* EVR4. EVR4 growth parameters were optimized using response surface methodology EVR4 degraded diesel with a maximum degradation efficiency of 96% within 4 d due to its synergistic role of biosurfactant and catabolic enzymes. Integrated BEK was found to be more effective in remediating diesel-contaminated soil (84%) than EK (67%).

PURIFICATION EFFECT AND MICROORGANISMS DIVERSITY IN AN ACORUS CALAMUS CONSTRUCTED WETLAND ON PETROLEUM-CONTAINING WASTEWATER
Xiang, W., X. Xiao, and J. Xue.
Environmental Pollutants and Bioavailability 32(1):19-25(2020)

A constructed wetland system using *Acorus calamus* was utilized to remediate petroleum-contaminated wastewater. The average removal rates of petroleum, chemical oxygen demand (COD), total nitrogen (TN), and total phosphorus (TP) were 97%, 80%, 67%, and 54%, respectively. Twenty-two strains were identified, including *Acinetobacter*, *Rhizobium*, and *Rhodobacter*, that had significant effects on organic matter decomposition and played a major role in removing petroleum, COD, and TN. Bacterial richness, community diversity, and petroleum treatment were higher in the summer sample than in the spring. Petroleum removal rates positively correlated with the Chao1 and Ace diversity indices.
https://www.tandfonline.com/doi/pdf/10.1080/26395940.2019.1711202?needAccess=true

General News

APPROACHES FOR MANAGING CONTAMINATED SEDIMENTS
Michalsen, M. and G. Rosen | SERDP & ESTCP Webinar Series, Webinar #124, December 2020

Two webinars presented as part of the SERDP and ESTCP series focused on DoD-funded research efforts to measure and manage contaminated sediments. The first presentation discussed an approach to develop and validate a standardized polymeric sampler method to quantify freely-dissolved organic contaminant concentrations of PAHs and PCBs in sediment porewater. The second discussed research results following long-term monitoring of AquaGate+PAC™ to reduce PCB availability in surface sediment at Pier 7 of the Puget Sound Naval Shipyard. https://www.serdp-estcp.org/Tools-and-Training/Webinar-Series/12-10-2020 *More information on the Puget Sound Naval Shipyard Pier 7 project:* http://www.sestcp.com/case_studies01.html

IN SITU CHEMICAL REDUCTION: STATE-OF-THE PRACTICE AND NEW ADVANCES
NAVFAC Engineering & Expeditionary Warfare Center, 12 pp, 2020

NAVFAC issued this fact sheet to describe the state-of-the-practice and new in situ chemical reduction (ISCR) advances. It focuses primarily on applying zero-valent iron [ZVI] to treat chlorinated solvents.
https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/i/Advances%20in%20ISCR%20_Fact%20Sheet_Final%20June%202020.pd

VAPOR INTRUSION MITIGATION MODEL: VIM MODEL V2.2
McAlary, T., ESTCP Project ER-201322, Model/Software, 2020

This spreadsheet tool was developed to help users: 1) interpret the results of sub-slab venting pilot tests, 2) calculate building-specific attenuation factors from flow and vacuum data, 3) assess the mass removal rate of a vapor mitigation system, and 4) interpret high volume sampling testing programs. Stepwise instructions to use the spreadsheet are provided.https://www.serdp-estcp.org/content/download/52097/512733/file/ER-201322%20VIM%20Model.xlsm *See SERDP page for more information on the project:* https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Emerging-Issues/ER-201322/ER-201322

RESEARCH ON PROGRESS IN COMBINED REMEDIATION TECHNOLOGIES OF HEAVY METAL POLLUTED SEDIMENT
Zhang, M., X. Wang, L. Yang, and Y. Chu.
International Journal of Environmental Research and Public Health 16(24):5098

This paper summarizes combined remediation technologies (physical, chemical, and bioremediation) for sediments contaminated with heavy metals. It summarizes research progress on physical-chemical, bio-chemical, and inter-organismal (including plants, animals, microorganisms) remediation, analyzes problems encountered when using combined remediation on heavy metal-contaminated river sediments, and examines future development trends.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6950138/pdf/ijerph-16-05098.pdf

BIOAVAILABILITY OF ORGANIC CHEMICALS IN SOIL AND SEDIMENT
Ortega-Calvo, J.J., and J.R. Parsons (eds). Springer Nature Switzerland, ISBN
978-3-030-57918-0, ISBN 978-3-030-57919-7, 428 pp, 2020

This book discusses bioavailability concepts and methods, summarizing the current knowledge on bioavailability science and possible pathways to integrate bioavailability into risk assessment and regulating organic chemicals. *View the table of contents and abstracts at* https://link.springer.com/book/10.1007/978-3-030-57919-7#toc

MINIMUM DETECTABLE CONCENTRATIONS WITH TYPICAL RADIATION SURVEY INSTRUMENTS FOR VARIOUS CONTAMINANTS AND FIELD CONDITIONS
Abelquist, E.W., J.P. Clements, A.M. Huffert, D.A. King, T.J. Vitkus, and B.A. Watson.
Nuclear Regulatory Commission, NUREG-1507 Rev.1, 332 pp, 2020

Facilities licensed by the U.S. Nuclear Regulatory Commission (NRC) must demonstrate that residual radioactivity at the facility site meets radiological dose-based criteria for license termination (e.g., the criterion of 25 millirem/yr for unrestricted release). These dose-based criteria are often expressed as concentration-based screening values for structural surface contamination in units of disintegrations per minute per 100 square centimeters and for surface soil contamination in units of picocuries per gram. As described in NUREG-1575, Revision 1, *Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM)*, issued August 2000, radiological survey instruments are used to measure radiation levels that are then directly compared to the release criteria. This document describes and quantitatively evaluates the effects of various factors on the detection sensitivity of commercially available portable field instruments used to conduct radiological surveys in support of decommissioning. This report updates the information from the original 1998 document by introducing concepts related to GPS/GIS based techniques and methodologies along with considerations for detection efficiency calculations, background interferences, signal degradation, and other topics associated with radiation survey instrumentation. https://www.nrc.gov/docs/ML2023/ML20233A507.pdf

PROCEEDINGS OF THE RADON BARRIERS WORKSHOP, JULY 25-26, 2018, NRC HEADQUARTERS, ROCKVILLE, MD
Fuhrmann, M., C. Benson, J. Waugh, M. Williams, and H. Arlt.
Nuclear Regulatory Commission, NUREG/CP-0312, 233 pp, 2019

The Radon Barriers Project is a research program to study the effects of changes in the properties of in-service engineered earthen covers over uranium mill tailings as the covers age. Field studies were conducted at four mill tailing disposal sites: Falls City in Texas, Bluewater in New Mexico, Shirley Basin South in Wyoming, and Lakeview in Oregon. Small areas on these sites were excavated, radon fluxes were measured, numerous observations were made, and samples were taken for a variety of parameters, such as saturated hydraulic conductivity, root counts, moisture, density, lead-210 concentrations, soil texture, structure, chemistry, and nematode counts. This document contains eight presentations given at a workshop held July 25-26, 2018, at NRC Headquarters to discuss findings from the project with regard to the current state of the barriers and comparison to their as-built condition and natural analog sites, prediction of long-term evolution, monitoring approaches, and long-term implications. https://www.nrc.gov/docs/ML1923/ML19239A170.pdf

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