Technology Innovation News Survey

Entries for December 1-15, 2019

Market/Commercialization Information

OPTIMIZED REMEDIATION CONTRACT (ORC) TX/LA GROUP
U.S. Army Corps of Engineers, District, Tulsa, OK.
Contract Opportunities on Beta.Sam.gov, Solicitation W912BV20R0003, 2019

This procurement is a small business set-aside under NAICS code 562910 (size standard 750 employees) for a C-type contract for the Texas/Louisiana (TX/LA) Group to provide services for a performance-based approach for to meet the Air Force's requirements for an ORC to conduct environmental remediation activities at nine Air Force installations in Texas and Louisiana. The scope includes environmental remediation and engineering activities necessary for investigation, design, remedial action, remedial construction, and remediation activities to support performance objectives that either advance or complete site cleanup during the contract period of performance at 99 Environmental Restoration Program sites, consisting of 81 Installation Restoration Program sites and 18 Military Munitions Restoration Program sites. Contract duration is 10 years. Responses are due by 3:00 PM CT on January 31, 2020. The Bidder Inquiry System (bidder inquiry key T5NZNI-3FT3V4) will be unavailable for new inquiries after 3:00 PM CT on January 21, 2020, to ensure an adequate response time is allotted to amend the solicitation, if necessary.
https://beta.sam.gov/opp/3e552623ad1d4dd6945e9fb97542cfc4/view

CHEMICAL AND GEOTECHNICAL ANALYSES OF ENVIRONMENTAL SAMPLES
U.S. Geological Survey, Office of Acquisition Grants, Denver, CO.
Contract Opportunities on Beta.Sam.gov, Solicitation 140G0220Q0014, 2020

This requirement is a total small business set-aside under NAICS 541380 (Testing Laboratories). The U.S. Geological Survey (USGS) conducts various types of scientific projects with DoD and other governmental agencies throughout the United States and other countries under the USGS DoD Environmental Conservation (DODEC) program. These DODEC projects investigate various types of contamination-related problems and conduct environmental studies at federal facilities. The projects typically require analytical services for chemical analyses of environmental (water, solid, air, and biological) samples for organic and inorganic constituents as well as geotechnical analyses of solid (sediment, sludge, and soil) samples using U.S. EPA analytical methods and other published methods (e.g., Standard Methods and ASTM methods). The majority of samples to be analyzed for the USGS projects will be aqueous samples collected mostly from surface sources, with some groundwater, sediment, and tissue samples. The environmental samples to be analyzed by the contractor will be collected by USGS. Contractor shall provide analytical services, supplies, and deliverables for chemical and geotechnical analyses of environmental samples collected for USGS projects. Offers are due by 2:00 PM ET on January 31, 2020. Period of performance is one base year and four option years, plus one 6-month option period to extend services. https://beta.sam.gov/opp/73a230341cf444cba035d08fb34a7b94/view For updates, monitor FedConnect at https://www.fedconnect.net/FedConnect/?doc=140G0220Q0014&agency=DOI

U.S. DOE, OFFICE OF ENVIRONMENTAL MANAGEMENT (EM), NATIONWIDE DEACTIVATION, DECOMMISSIONING AND REMOVAL (DD&R) PROCUREMENT
U.S. DOE, EM Consolidated Business Center, Cincinnati, OH.
Contract Opportunities on Beta.Sam.gov, Solicitation 89303319REM000052, 2019

This procurement is a full and open competition (NAICS code 562910) to establish a contract vehicle that DOE can utilize at sites nationwide to acquire timely, cost-effective, legally sound deactivation, decommissioning, and removal (DD&R) and associated support services to further the government's mission toward reducing environmental liabilities. DOE EM plans to contract for DD&R work at various locations throughout the United States, including but not limited to DOE sites under EM, National Nuclear Security Administration, Office of Naval Reactors, and the Office of Science. This IDIQ contract has a preference for the issuance of cost-plus-incentive-fee and firm-fixed-price Task Orders. Offers are due by 4:00 PM ET on February 3, 2020. https://beta.sam.gov/opp/f596c2441eba4269bdd0808e9444829d/view See additional details on the EMCBC Nationwide DD&R procurement website at https://www.emcbc.doe.gov/SEB/nationwideddr/

Cleanup News

IMPLEMENTATION AND PERFORMANCE OF THERMALLY-ENHANCED BIOREMEDIATION FOR TARGETED DNAPL SOURCE TREATMENT
Welch, A., Z. Nguyen, T.W. Macbeth, R.E. Chichakli, C. Cora, K. Lynch, and T. Powell.
Northwest Remediation Conference: Cleaning Up and Re-Using Contaminated Properties, 3 October, Tacoma, WA, 21 slides, 2019

A multi-component remedy, including in situ thermal remediation (ISTR) and enhanced anaerobic biodegradation (EAB), was implemented at the Well 12A Superfund site in Tacoma, WA. The goal of ISTR and EAB is to reduce mass discharge from the source areas by 90%. EAB was implemented over a large area of the site containing a thin silt unit with residual chlorinated solvent mass and two localized areas above containing DNAPL (predominantly 1,1,2,2-PCA and TCE). Following implementation, dissolved-phase concentrations increased in the DNAPL areas due to enhanced dissolution. Reductive dechlorination products increased, but at a slower rate than desired. Thermal enhancement by electrical resistance heating (ERH) was designed to increase the rate of dissolution of the DNAPL and to increase the biodegradation kinetics. The ERH treatment zone was created using an array of electrodes around each DNAPL area, with temperature monitoring in the center of each array. The ERH system was maintained at a target temperature between 45-50ºC throughout most of the 12-month operation. Monitoring data indicated that the smaller DNAPL source was substantially depleted during the first six months of operation, while the larger DNAPL source exhibited declining concentrations after 12 months of operation. Monitoring indicated only minimal biodegradation occurred at the DNAPL-impacted locations. Rapid reductive dechlorination occurred in areas immediately surrounding the electrode array, where temperatures were slightly lower and more favorable for enhanced biological degradation. Since the implementation of ERH, PCA and TCE concentrations in the DNAPL source wells have declined between 80 and 99%. https://owremediation.com/wp-content/uploads/2A_Welch.pdf *See* ***pages 11-38*** *of the South Tacoma 2018 Five Year Review https://semspub.epa.gov/work/10/100120454.pdf and the 2009 ROD amendment* https://semspub.epa.gov/work/10/500010097.pdf

MODELING AND UNCERTAINTY ANALYSIS FOR REMEDY SELECTION TO ADDRESS GROUNDWATER DISCHARGING TO SURFACE WATER
Lindstrom, K., K. Marini, and D. Dahlstrom.
10th International Conference on the Remediation and Management of Contaminated Sediments, 11-14 February, New Orleans, LA, 24 slides, 2019

Complex features, including a partially penetrating river controlled by a dam and uncertain future operation of the dam in a developed urban setting, necessitated a modeling tool to aid in evaluation of remedial alternatives at a former manufactured gas plant in Flint, MI, An existing MODFLOW-SURFACT™ model was updated and calibrated with site characterization data to create a robust tool for evaluating past, current, and potential future conditions. Remedial alternative scenarios were run with the fifty parameter sets, and concentration, and mass flux results were compared between scenarios using the range of results to quantify the uncertainty of model estimates. Based on the modeled groundwater flow and solute concentrations from Null Space Monte Carlo (NSMC) uncertainty analysis, two dredging and capping alternatives were carried forward in a feasibility study, and a uniform, impermeable cap was ultimately selected for design. Modeling results indicated the impermeable cap would be effective at limiting groundwater discharge to surface water from the areas of greatest groundwater impacts, and groundwater flow paths to post-remedy surface water discharge locations would be lengthened after cap installation. Concentrations are expected to attenuate along the lengthened flow paths prior to discharge to surface water. Informed by the NSMC analysis, a monitoring plan was developed to assess compliance with cleanup criteria following the sediment response action and included areas of greatest uncertainty.
https://www.battelle.org/docs/default-source/conference-proceedings/2019-sediments-conference-proceedings/b1_cap-design-and-modeling/h1_0850_-118_lindstrom.pdf?sfvrsn=7b221b54_2

ALL ALONG THE WATERFRONT - CASE STUDY UTILIZING VARIOUS REMEDIAL STRATEGIES FOR A LARGE BROWNFIELD SITE IN YONKERS, NY
Godick, M. and P. McHugh. | National Ground Water Association Groundwater Week, 3-5 December, Las Vegas, NV, 27 slides, 2019

A combined groundwater remediation remedy was used on the 10-acre Polychrome R&D Lab Site along the Hudson River waterfront in Yonkers, NY. The site had multiple sources of historical contamination, including coal tar from an offsite manufactured gas plant. A six-year assessment that included traditional assessment techniques, as well as TarGOST laser-induced fluorescence technology, was conducted to delineate the vertical and horizontal extent of coal tar contamination. The remedy required a complex combination of remedial solutions including in situ soil solidification (ISS), auger column ISS, slurry wall, injection of rigid foam along preferential utility pathways, source removal by excavation and NAPL recovery, bioremediation, sub-slab depressurization system, and site capping. Remedial efforts were complicated by a variety of factors including an elevated, tidal water table in the floodplain; multiple geologic units; coal tar contamination at depth; poor soil quality/strength due to historical fill; deteriorated and aged municipal utilities and adjacent structures; nearby sensitive receptors including an adjacent food manufacturing facility; significant regulatory oversight; and redevelopment plans requiring construction in areas of residual contamination. The presentation focused on the effect of remediation on groundwater quality, comparing pre- and post-remediation results in addition to discussing regulatory implications of baseline emerging contaminant sampling post-remediation. *To download the presentation:* https://ngwa.confex.com/ngwa/gw19/meetingapp.cgi/Paper/12824 *See the Final Engineering Report for more information*

Demonstrations / Feasibility Studies

EFFICIENT REMEDIATION OF RIVER SEDIMENTS CONTAMINATED BY POLYCHLORINATED BIPHENYLS AND HEXACHLOROBENZENE BY COUPLING IN SITU PHASE-INVERSION EMULSIFICATION AND BIOLOGICAL REDUCTIVE DECHLORINATION
Chang, S.-C., C.-W. Yeh, S.-K. Lee, T.-W. Chen, and L.-C. Tsai.
International Biodeterioration & Biodegradation 140:133-143(2019)

A field study was conducted to demonstrate effective remediation of Aroclor 1254- and hexachlorobenzene (HCB)-contaminated soils by coupling in situ phase-inversion emulsification and biological reductive dechlorination (ISPIE/BiRD). Results indicated that a single ISPIE operation can remove about 62% and 60% of weathered Aroclor 1254 and HCB, respectively. For weathered HCB and Aroclor 1254, the total removal could reach as high as 98% in 70 days. Metagenomic results showed that heat selection during ISPIE significantly changed the diversity and species evenness of the microbial community and that the *Dehalococcoides* were not positively correlated with the PCB removals. Instead, heat-tolerant archaea, *Methanosaeta*, may play much more important roles in the subsequent biological dechlorination.

INVESTIGATION OF PERFLUOROALKYL ACIDS IN TAIHU LAKE: OCCURRENCE, TRANSPORT AND ENVIRONMENTAL RISK ASSESSMENT
Li, Y., W. Yang, and C. Yao.
IOP Conference Series: Earth and Environmental Science 218:012129(2019)

A polar organic chemical integrative sampler (POCIS) consisting of 200 mg of weak anion-exchange sorbent packed between two polyethersulfone membranes was used to quantify the concentration of PFAAs in surface water and sediment and to evaluate the environmental implications on different aquatic organisms in Taihu Lake, China. PFAAs were also actively measured in surface water and sediment samples for comparison to the passive sampler. Twelve cages were deployed containing three POCIS samplers per cage and exposed for 1, 2, 4, 7, 10, and 14 days (two for each exposure period). The concentrations of PFAAs measured by POCIS ranged from 11.79-390.77 ng/L at the sampling locations. The concentrations of PFAAs in active sediment samples ranged from 0.52-13.58 ng/L. PFOA was the most abundant compound detected with a mean concentration of 289.34 ng/L in water and 12.6 ng/g dry weight in sediments. Risk quotient results indicated that PFAAs had no risk to aquatic organisms in the Taihu Lake system. https://iopscience.iop.org/article/10.1088/1755-1315/218/1/012129/pdf

SYNTHESIS, CHARACTERIZATION, AND FIELD EVALUATION OF NOVEL CELLULOSE NANOCRYSTALS-BASED MATERIALS TO MONITOR HYDROCARBON AND BACTERIA IN GROUNDWATER
Shen, W-Z., V. Collins, P. Mussone, K. Bradshaw, T. Keenan, and M. Tse.
RemTech 2019: Remediation Technologies Symposium, 16-18 October, Banff, 22 slides, 2019

A new class of high-porosity adsorbent composite materials was developed and evaluated in the field to monitor hydrocarbons and microbial communities in groundwater at sites being remediated with in situ biostimulatory aqueous solutions. The chemical stability of these materials and their adsorption capacity for hydrocarbons and bacteria was first tested in a laboratory setting using both model water and then groundwater samples collected from a hydrocarbon-impacted site undergoing active bioremediation. The materials were then evaluated in the field during an active bioremediation experiment with the goal to correlate the sorption capacity of the materials, bacteria growth, and bacteria population. The data from laboratory and field experimentation are discussed in the presentation. https://www.esaa.org/wp-content/uploads/2019/10/19-Shen.pdf

COMBINED SIEVING AND WASHING OF MULTI-METAL-CONTAMINATED SOILS USING REMEDIATION EQUIPMENT: A PILOT-SCALE DEMONSTRATION
Li, Y., X. Liao, and W. Li.
Journal of Cleaner Production 212:81-89(2019)

A combined sieving and washing process was piloted-tested to remediate heavy metals at a historically-contaminated site. Lab results showed that the optimum parameters for the washing process were a pH of 2, a temperature of 30°C, and a 10:1 liquid/soil ratio. The results from field remediation proved that the method could reach an overall removal of 37.1-51.1% As, 44.3-78.1% Cd, 21.2-64.3% Pb, and 29.2-59.4% Zn in various particle fractions. To prevent secondary pollution, coagulating sedimentation and adsorption processes were used to treat the wastewater, with removal rates of 99.4% As, 99.9% Cd, 93.5% Pb and 99.1% Zn. A composite material was adopted to solidify the fine clay that was enriched with a large amount of metals and form it into non-fired bricks. Based on the mass balance, 23 kg of stone and 140 kg of gravel were separated, and 367 kg of fine clay with a 45% soil moisture content was treated by solidification and stabilization, achieving a volume reduction of ~36.5%. The method reduced contamination in soils while minimizing the environmental risk.

APPLICATION OF γ-PGA AS THE PRIMARY CARBON SOURCE TO BIOREMEDIATE A TCE-POLLUTED AQUIFER: A PILOT-SCALE STUDY
Luo, S.G., S.C. Chen, W.Z. Cao, W.H. Lin, Y.T. Sheu, and C.M. Kao.
Chemosphere 237:124449(2019)

Gamma poly-glutamic acid (γ-PGA) was used as the primary carbon and nitrogen source to bioremediate TCE-contaminated groundwater in a pilot-scale study. A 40L γ-PGA solution was injected into the aquifer via an injection well (IW) for substrate supplement. Groundwater samples were collected from monitor wells and the IW periodically and analyzed for TCE and its byproducts, geochemical indicators, dechlorinating bacteria, and microbial diversity. Injecting γ-PGA resulted in increased total organic carbon (up to 9820 mg/L in the IW), which biodegraded, causing anaerobic conditions to form. Increased ammonia concentration caused neutral groundwater conditions, benefitting the growth of *Dehalococcoides*. The negative zeta potential and micro-scale diameter of γ-PGA allowed its globule to distribute evenly within soil pores. After 59 days, up to 93% of TCE removal was observed, from 0.14 to 0.01 mg/L, and TCE dechlorination byproducts were also biodegraded. Next-generation sequence analyses revealed that reductive dechlorinating conditions caused variations in microbial diversity and dominant bacterial species. The dominant four groups of bacterial communities including dechlorinating bacteria, vinyl chloride degrading bacteria, hydrogen-producing bacteria, and carbon biodegrading bacteria.

Research

FUNDING FOR THE ENVIRONMENTAL JUSTICE COLLABORATIVE PROBLEM-SOLVING (EJCPS) COOPERATIVE AGREEMENT PROGRAM
Environmental Protection Agency, Funding Opportunity EPA-OP-OEJ-20-01, 2019

The EJCPS Cooperative Agreement Program provides funding to support community-based organizations in their efforts to collaborate and partner with local stakeholder groups (e.g., local businesses and industry, local government, medical service providers, and academia) as they develop and implement community-driven solutions that address environmental and/or public health issues for underserved communities. For purposes of this announcement, "underserved community" refers to a community with environmental justice concerns and/or vulnerable populations, including minority, low income, rural, tribal, indigenous, and homeless populations. Eligible projects must demonstrate the use of the EJCPS Model to support collaborative efforts during the project period. Applying organizations should have a direct connection to the underserved community affected by the environmental harms and risks detailed in the work plan. About 10 awards are anticipated out of estimated total program funding of $1.2M. The closing date for applications is February 7, 2020. https://www.grants.gov/web/grants/view-opportunity.html?oppId=322417

FUNDING FOR RESEARCH ON PFAS IMPACTS IN RURAL COMMUNITIES AND AGRICULTURAL OPERATIONS: REQUEST FOR APPLICATIONS
U.S. Environmental Protection Agency Funding Opportunity EPA-G2020-ORD-B1, 2019

Per- and poly-fluoroalkyl substances (PFASs) are a diverse family of manufactured chemicals that have been in use since the 1940s and are designed to resist heat, water, and oil. Used in a variety of consumer products and industrial

applications, the compounds are highly water-soluble, persistent, and possibly bioaccumulative. There is evidence that exposure to PFASs can lead to adverse health outcomes in humans. EPA, as part of its National Priorities program, is seeking applications to support research to better understand the potential impacts of PFASs on water quality and availability in rural communities and agricultural operations across the United States. Research is solicited to address the following areas: (1) Better understanding of PFAS occurrence, fate, and transport in water sources used by rural communities and agricultural operations, and (2) Novel or improved PFAS treatment methods in small drinking water systems and typical small wastewater system treatment trains, including influents, effluents, and biosolids/residuals. Three awards are anticipated out of estimated total program funding of $4,832,256. This funding opportunity closes on February 11, 2020. https://www.grants.gov/web/grants/view-opportunity.html?oppId=322677 See additional information at https://www.epa.gov/research-grants/national-priorities-research-pfas-impacts-rural-communities-and-agricultural

FUNDING FOR ENVIRONMENTAL SYSTEM SCIENCE
U.S. Department of Energy, Office of Science, Funding Opportunity DE-FOA-0002184, 2019

DOE is soliciting applications for research in environmental systems science (ESS), including terrestrial ecosystem science and subsurface biogeochemical research. Using an iterative approach to model-driven experimentation and observation and interdisciplinary teams, ESS-supported scientists work to unravel the coupled physical, chemical, and biological processes that control the structure and functioning of terrestrial ecosystems and integrated watersheds across critical spatial and temporal scales. This opportunity encompasses two topic areas: (1) terrestrial ecology, specifically linking above- and belowground processes, as well as methane biogeochemistry; and 2) subsurface and watershed hydro-biogeochemistry, specifically studying the function and dynamics of hydro-biogeochemical processes within watersheds. All applications are required to clearly delineate an integrative, hypothesis-driven approach and describe the existing needs/gaps in state-of-the-art models. Applicants should provide details on how the results of the proposed research will be used to improve the predictability and sophistication of integrated watershed systems and/or terrestrial ecosystem models. About 12 awards are anticipated out of estimated total program funding of $10M. The closing date for applications is February 20, 2020. https://www.grants.gov/web/grants/view-opportunity.html?oppId=322334

AN OPTIMIZED CR(VI)-REMOVAL SYSTEM USING SN-BASED REDUCING ADSORBENTS
Papadopoulos, G., T. Asimakidou, D. Karfaridis, I. Kellartzis, G. Vourlias, M. Mitrakas, et al.
Water 11:2477(2019)

This study evaluates an integrated household water filtration setup for point-of-use applications to remove Cr(VI) from drinking water. A tin-based Cr(VI)-oriented adsorbent was tested under various contact times, pH values and Cr(VI) concentrations. The adsorbent is made of a chloride-substituted stannous oxy-hydroxide with a structure resembling that of the mineral abhurite. It demonstrated high reducing capacity that triggered the formation of insoluble Cr(III) hydroxides and the complete removal of Cr(VI) in high volumes of polluted water. Test operation of the filtration system verified its ability to produce Cr(VI)-free water in compliance with the impending drinking water regulation, even for extreme initial concentrations (1,000 μg/L). *This article is* ***Open Access*** *at* https://www.mdpi.com/2073-4441/11/12/2477/htm

FIELD TRIALS OF EX SITU SMOLDERING TREATMENT (STARX) OF OIL SLUDGE
Murray, C., Master's thesis, University of Western Ontario, 421 pp, 2019

The ex situ Self-sustaining Treatment for Active Remediation (STARx) technology was evaluated in soil pile configurations using an engineered base concept called Hottpad™, at both the prototype (0.35-1.3m^3) and field (80-160m^3) scales. The treatment was applied to oily sludge from crude oil tank bottoms and oil-water separation processes mixed with sand or soils at concentrations from 4,020-115,000 mg/kg total petroleum hydrocarbons. The relationships between initial soil concentrations, offgas production, mass destruction rates, cycle times, and peak temperatures provided important insights into the performance and costs of applying the technology at field scale. STARx was shown to successfully destroy the wastes to below laboratory detection limits, with contaminant mass removal efficiencies of greater than 98% being observed. https://ir.lib.uwo.ca/cgi/viewcontent.cgi?article=8553&context=etd

MASS TRANSFER MODEL OF SOIL VAPOR EXTRACTION UNDER THERMAL TREATMENT FOR REMOVING A VOLATILE CONTAMINANT
Li, P., X. Liao, X. Yan, D. Ma, X. Cui, and H. Tao.
Environmental Engineering and Management Journal 17(1):107-114(2018)

A series of column experiments were conducted to study benzene removal and process principles using soil vapor extraction (SVE) under different thermal conditions. Compared with the normal SVE method, steam injection and electrical resistance heating effectively increased the benzene vapor diffusion and removal rates. The removal efficiency of benzene with the electrical resistance heating method was 96.5%, which was significantly higher than that with the steam injection method (90.5%) or with the normal SVE method (85.2%). In addition, SVE with electrical resistance heating had a more stable heating effect than SVE with steam injection in homogeneous sandy soil. Based on existing equilibrium SVE models, a one-dimensional non-equilibrium mass transfer model was established for estimating volatile contaminant removal under thermal enhancement. The improved model can accurately reflect benzene content variations using SVE with electrical resistance heating and provides a theoretical basis for preliminary site remediation assessments using SVE under continuous thermal treatment.

SIMULATION OF IN SITU BIODEGRADATION OF 1,4-DIOXANE UNDER METABOLIC AND COMETABOLIC CONDITIONS
Barajas-Rodriguez, F.J., L.C. Murdoch, R.W. Falta, and D.L. Freedman.
Journal of Contaminant Hydrology 223:103464(2019)

The study compared bioremediation options using microbes that co-metabolize 1,4-dioxane following growth on a primary substrate with microbes using 1,4-dioxane as a sole substrate. The comparison used a transport model that incorporated advection, dispersion and biodegradation reactions. The model was coupled to an approximate steady-state air sparging simulation calibrated with field data for 1,4-dioxane and propane concentrations from a previous pilot study. The two approaches were evaluated under different conditions including initial 1,4-dioxane concentration and oxygen, propane, and biomass loading rates. Remediation success was based on the time to reach an average 1,4-dioxane concentration of 1 μg/L and the percent of 1,4-dioxane biodegraded after 10 years of simulation. The initial concentration of 1,4-dioxane strongly influenced effectiveness. When initial concentrations were

General News

INTERIM RECOMMENDATIONS FOR ADDRESSING GROUNDWATER CONTAMINATED WITH PFOA AND PFOS
Office of Land and Emergency Management Directive 9283.1-47, 7 pp, 2019

EPA has released interim recommendations for screening levels and preliminary remediation goals to inform the development of final cleanup levels for PFOA and/or PFOS groundwater contamination at sites being evaluated and addressed under federal cleanup programs, including CERCLA and RCRA. The recommendations are consistent with existing EPA guidance and standard practices, in addition to applicable statutes and regulations. The recommendations may be useful for state, tribal, or other regulatory authorities. https://www.epa.gov/sites/production/files/2019-12/documents/epas_interim_recommendations_for_addressing_groundwater_contaminated_with_pfoa_and_pfos_dec_2019.pdf Fact sheet https://www.epa.gov/sites/production/files/2019-12/documents/pfas_groundwater_fact_sheet.pdf Press Release: https://www.epa.gov/newsreleases/epa-releases-pfas-groundwater-guidance-federal-cleanup-programs-fulfilling-pfas-action

A REVIEW OF THE EMERGING TREATMENT TECHNOLOGIES FOR PFAS CONTAMINATED SOILS
Mahinroosta, R. and L. Senevirathna.
Journal of Environmental Management 255:109896(2020)

A comprehensive evaluation of existing and emerging technologies for remediating PFAS-contaminated soils was conducted with guidance on which approach to use in different contexts. The functions of all remediation technologies, their suitability, limitations, and the scale applied from laboratory to the field are presented as a baseline for understanding the research need for treatment in soil environments. Methods discussed include immobilization, soil washing, thermal treatment techniques, chemical oxidation, ball milling, and electron beams.

ASSESSMENT OF GROUNDWATER QUALITY AND REMEDIATION IN KARST AQUIFERS: A REVIEW
Kalhor, K., R. Ghasemizadeh, L. Rajic, and A. Alshawabkeh.
Groundwater for Sustainable Development 8:104-121(2019)

This study presents an overview of hydrogeological processes and concepts regarding groundwater flow and contaminant transport in karstic systems and a short discussion on surface water and groundwater interaction. It also reviews different approaches that have been developed by researchers to investigate and understand hydrogeological processes and groundwater behavior in karst aquifers. Groundwater contamination issues and the most common and effective remediation techniques in karstic terrains are discussed, and modeling techniques and remote sensing methods as beneficial and powerful tools for assessing groundwater flow and contaminant transport in karst terrains are evaluated. In each section, relevant research works conducted for Puerto Rico are discussed and some recommendations are presented to complement the ongoing hydrogeological investigations on this island. *This article is* ***Open Access*** *at* https://www.sciencedirect.com/science/article/pii/S2352801X18301632

MN-BASED CATALYSTS FOR SULFATE RADICAL-BASED ADVANCED OXIDATION PROCESSES: A REVIEW
Huang, J. and H. Zhang. | Environment International 133 (Part A):105141(2019)

A comprehensive review was conducted of various Mn-based materials to activate peroxymonosulfate (PMS) and peroxydisulfate (PDS) for contaminant degradation. The article covers activation mechanisms of different Mn-based catalysts; the effects of pH, inorganic ions, natural organic matter, dissolved oxygen content, temperature, and the crystallinity of the materials on the catalytic reactivity; and important instrumentations and technologies to characterize Mn-based materials and to understand the reaction mechanisms. Three common overlooks in the experimental designs for examining the PMS/PDS-MnOx systems were also discussed. Future research directions were suggested to further improve the technology and to provide guidance to develop cost-effective Mn-based materials to activate PMS/PDS.

UNDERSTANDING AND DESIGNING THE STRATEGIES FOR THE MICROBE-MEDIATED REMEDIATION OF ENVIRONMENTAL CONTAMINANTS USING OMICS APPROACHES
Malla, M.A., A. Dubey, S. Yadav, A. Kumar, A. Hashem, and E.F. Abd Allah.
Frontiers in Microbiology 9:1132(2018)

The integrative role of the multi-omics approaches in microbial-mediated bioremediation is presented. The review also includes how the multi-omics approaches help to comprehend and explore the structural and functional aspects of the microbial consortia in response to the different environmental pollutants, and success stories using these approaches. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5994547/pdf/fmicb-09-01132.pdf

TREATMENT TRAIN APPROACHES FOR THE REMEDIATION OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS): A CRITICAL REVIEW
Lu, D. S. Sha, J. Luo, Z. Huang, and J.X. Zhang.
Journal of Hazardous Materials 386:121963(2020)

New insight of recently reported treatment train studies selected from ~150 different publications with regards to the remediation of PFAS and their innovative designs, remediation performances, present limits, and possible improvements are discussed. Based on a comprehensive review of the current treatment train studies, this review work proposes a new design that consists of three individual technologies-nanofiltration, electrochemical anodic oxidation, and electro-Fenton degradation-to maximize economic and environmental benefits of PFAS remedial measures.

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.

Mention of non-EPA documents, presentations, or papers does not constitute a U.S. EPA endorsement of their contents, only an acknowledgment that they exist and may be relevant to the Technology Innovation News Survey audience.