

Technology Innovation News Survey

Entries for October 16-31, 2018

Market/Commercialization Information

IDAHO CLEANUP PROJECT (ICP): RADIOACTIVE WASTE MANAGEMENT COMPLEX (RWMC) CLOSURE

Department of Energy, EM Consolidated Business Center, Cincinnati, OH.
Federal Business Opportunities, Solicitation 89303319REM000034, 2018

DOE's Office of Environmental Management is currently in the acquisition planning stage for the potential award of a contract for the Idaho Radioactive Waste Management Complex (RWMC) closure. This RFI's purpose is to solicit input via capability statements from interested parties with the specialized capabilities necessary to meet all of the major elements of scope for the upcoming competitive procurement. DOE seeks feedback from contractors and other interested parties regarding end-state options for innovative approaches for the performance of the major elements of scope as well as insight into potential contracting alternatives. This contract is intended to align with the current EM end-state contract model; however, the final contract type, period of performance, amount of funding, and set-aside possibilities has yet to be determined. See more on the major elements of scope on the ICP acquisition website under News at <https://www.emchr.doe.gov/SEB/icp/> and on FedConnect at <https://www.fedconnect.net/FedConnect?doc=89303319REM000034&agency=DOE> [Note: It might be necessary to copy and paste the URL into your browser for direct access]. Submit all capability statements and questions by 5:00 pm ET on December 12, 2018, via email. <https://www.fbo.gov/spg/DOE/PAM/HQ/89303319REM000034/listing.html>

PORTSMOUTH GASEOUS DIFFUSION PLANT (GDP) DECONTAMINATION AND DECOMMISSIONING

Department of Energy, EM Consolidated Business Center, Cincinnati, OH.
Federal Business Opportunities, Solicitation 89303319NEM000016, 2018

DOE's Office of Environmental Management (EM) is planning its acquisition strategy for contract award(s) for the completion of the Portsmouth GDP Life-Cycle D&D Project. This RFI solicits input via capability statements from interested parties with the specialized capabilities necessary to meet all of the major elements of scope for the upcoming competitive procurement for the Portsmouth GDP D&D requirements. Within these capability statements, DOE seeks feedback from contractors and other interested parties regarding options for innovative approaches for the performance of the major elements of scope as well as insight into potential contracting alternatives for accelerated achievement of project end states. This market research will assist DOE with identifying interested and capable sources and developing its acquisition strategy. Key market research goals include identifying and minimizing barriers to competition, evaluating small business capabilities, and identifying risks. Work under this contract will include demolition and disposal of all GDP facilities, process equipment, related process buildings, and other ancillary GDP facilities. The Portsmouth D&D Project also includes remediation of contaminated soils and groundwater, providing infrastructure services to site users, and disposition of uranium material. A performance work statement is not available at this time, but more information on the major elements of scope is posted on EM's GDP acquisition website at <https://www.emchr.doe.gov/seb/portsdandd/> under NEWS and on FedConnect at <https://www.fedconnect.net/FedConnect?doc=89303319NEM000016&agency=DOE> [Note: It might be necessary to copy and paste the URL into your browser for direct access]. Capability statements and questions pertaining to this announcement must be received by 5:00 PM ET on December 14, 2018. <https://www.fbo.gov/spg/DOE/PAM/HQ/89303319NEM000016/listing.html>

OPERATIONS AND MAINTENANCE SERVICES FOR ROCKY MOUNTAIN ARSENAL

Department of the Army, ACC - APG (W9125F) Denver, Commerce City, CO.
Federal Business Opportunities, Solicitation W9125F19R0001, 2018

This sources sought notice constitutes market research to assess the interest, qualifications, and availability of small business types interested in performing work under a proposed contract for O&M of the Army's Rocky Mountain Arsenal (RMA) property and facilities located near Commerce City, Colorado. By means of responses to this notice, the U.S. Army intends to determine the extent of capable firms that are currently engaged in or can demonstrate experience in providing similar services to those required at RMA. The work includes O&M of the groundwater treatment plants, sampling and monitoring of groundwater wells and surface water, maintenance of landfills and covers, maintenance of infrastructure and facilities, regulatory interface support, program records and reporting, land use controls compliance, environmental compliance, and records management and GIS support. The NAICS code for this procurement is 562910 (Environmental Remediation Services), small business size standard 750 employees. The contract type has yet to be determined, although a cost-type contract with fixed-price elements is being considered for potential contract duration of 9 years. The scope has yet to be finalized, but the magnitude of this procurement is estimated to be \$50M - \$75M for the anticipated duration of the contract. The date of award might be around November 1, 2021. Interested parties who consider themselves qualified to perform the requirements outlined in the FedBizOpps notice are invited to submit a response by 11:59 PM ET on January 8, 2019. Only firms that are capable of providing support in all areas either as a prime or with teaming or with a subcontractor will be considered capable of performing the requirements. <https://www.fbo.gov/notice/b8b1368c8e1c2718e268c7c33a9bb79>

GROUNDWATER MONITORING WELL DRILLING IDIQ, LONG ISLAND, NEW YORK

Department of the Interior, U. S. Geological Survey, Reston, VA.
Federal Business Opportunities, Solicitation 140G0119R0003, 2018

The Department of the Interior, U.S. Geological Survey, New York Water Science Center has a requirement for the drilling and construction of between 16 and 46 groundwater monitoring wells in designated locations on Long Island, New York, in support of the Long Island Sustainability Project. The drilling project is intended to take place over a five-year period. The work will include well drilling, core sampling, logging, installation of casing and well screen, filter pack, grouting, and cleanup and site restoration. The contractor will be required to utilize Bentonite Drilling Fluid (as distributed by Johnson Screens Inc. or equal) for all rotary drilling called for in the contract. USGS does not anticipate encountering contaminant plumes warranting the use of personal protective equipment higher than level D. The project magnitude is between \$6M to \$10M. The details of the requirement are available only on FedConnect at <https://www.fedconnect.net/FedConnect?doc=140G0119R0003&agency=DOI> [Note: It might be necessary to copy and paste the URL into your browser for direct access]. Proposals are due by 4:30 PM ET on January 2, 2019. <https://www.fbo.gov/spg/DOI/USGS/USGS/140G0119R0003/listing.html>

Cleanup News

COMBINED AND PHASED REMEDIATION OF A PETROLEUM AND CHLORINATED SOLVENT PLUME USING SOIL VAPOR EXTRACTION, AIR SPARGE, MULTI-PHASE EXTRACTION, GROUNDWATER PUMP AND TREAT, AND BIOREMEDIATION AT A FLORIDA DRYCLEANER SOLVENT CLEANUP PROGRAM AND PETROLEUM RESTORATION PROGRAM SITE

Moore, B. and L. Anderson.
Florida Remediation Conference 2018, December 5-6, abstract, 2018

The McNatts drycleaning facility operates in Tampa and has been the subject of ongoing assessment and remediation through the Florida Drycleaning Solvent Cleanup Program since the late 1990s. The initial assessment identified highly concentrated soil and groundwater PCE impacts beneath and in close proximity to the dry cleaning equipment. The combined remedy portion of the cleanup involved soil vapor extraction (SVE) for shallow soils, multiphase extraction for treatment of deeper clayey soils, and groundwater recovery for plume control. A phased portion relied on the simultaneous use of air sparge/SVE to treat commingled petroleum impacts. The final phase of the remedy transitioned to enhanced bioremediation to polish remaining chlorinated solvent groundwater impacts. See the [2018 Remedial Action Status Report and other site documents at http://prodenv.dep.state.fl.us/DepNexus/public/electronic-documents/ERIC_4752/facilitysearch](http://prodenv.dep.state.fl.us/DepNexus/public/electronic-documents/ERIC_4752/facilitysearch).

PRELIMINARY CLOSURE REPORT: SOLVENTS RECOVERY SERVICE OF NEW ENGLAND, INC.

U.S. EPA Region 1, 26 pp, 2018

Past operations at this permitted hazardous waste treatment and storage facility led to the release of VOCs (chlorinated hydrocarbons, ketones, alcohols, aromatics, SVOCs), PCBs, dioxins, and metals. VOC contamination leached into groundwater and migrated off site into the Curtiss Street Well Field and beyond the Quinipiac River. A time-critical excavation in 1992 removed 19 drums of soil contaminated with up to 350 mg/kg PCBs and 100 mg/kg VOCs. Operation of the groundwater pump-and-treat system revealed the presence of NAPLs in 57,000 yd³ of overburdened aquifers. In situ thermal treatment coupled with vapor extraction wells were used to remediate ~210,000 kg NAPL in the vadose zone between May 2014 and March 2015. In the final phase of remediation, soils from five areas of the property were excavated and backfilled with clean soil. Solar panels installed in September 2018 on the cap are expected to provide the energy needed for future operation and maintenance. <http://www.srsnpsite.com/wp-content/uploads/2018/09/PCOR-final-sept-2018.pdf>

CASE STUDY: PHC REMEDIATION OF A COMPLICATED SITE USING A MULTI-TECHNOLOGY APPROACH

Tunncliffe, B. and P. O'Neill.
RemTech 2018: Project Management and Logistics Session, October 10-12, 51 slides, 2018

The site posed unique challenges stemming from the recent acquisition of the property with the seller retaining environmental liability. Multiple petroleum hydrocarbon (PHC) sources were present across the site along with an on-site PHC spill that occurred part way through the cleanup efforts. During site remediation, new PHC sources were discovered and remedial plans were adjusted to deal with them. Pilot-scale investigations prior to remediation included both injection testing and 24-hr pumping tests at multiple locations on site. The remediation plan for the site involved multiple excavations, an automated pump-and-treat system, surfactant flushing, bedrock and overburden injection well installations (both horizontal and vertical), and in situ injections of multiple amendments: persulfate and peroxide for in situ oxidation in 2015 and 2016, and nutrients for enhanced bioremediation in 2017.

Longer abstract: <https://www.esaa.org/wp-content/uploads/2016/05/Abstracts-RT2018-48.pdf>
Slides: <https://www.esaa.org/wp-content/uploads/2018/10/18-Tunncliffe.pdf>

THERMAL REMEDIATION OF LARGE CONTAMINATION FROM FORMER DRYCLEANERS IN KRISTIANSTAD, SWEDEN

Holm, J., N. Ploug, A. Dzafic, E. Remstam, P. Anderson, A. Bank, and H. Lindvall.
NORDRÖCS 2018: 7th Joint Nordic Meeting on Remediation of Contaminated Sites: Poster.

The Faergaren 3 site in Kristianstad (Skane, Sweden) formerly housed a dye works and dry cleaner whose operational releases generated heavy site contamination, mainly PCE. The site, which sits atop one of the most valuable groundwater resources in Scandinavia, was prioritized for remediation funded by the Swedish EPA and headed by Kristianstad Kommun. The remedy comprised a combination of removing the top 2.5 meters of soil on site and implementing thermal treatment from 2.5 m bgs to 20 m bgs inside a 900 m² area. At the end of excavation, an extraction layer was installed from 2-2.5 m bgs to be used for thermal remediation. The remediation goal is to achieve an average concentration of chlorinated solvents of 1 mg/kg. The geology at the site is a combination of clay, sand, and sandstone. Thermal remediation in the form of in situ thermal desorption (ISTD) was applied on the site using 92 heater elements combined with an extraction and treatment system for the vaporized contaminants. Contaminated vapors were extracted through the gravel pack along the installed heaters and subsequently through the installed extraction layer. ISTD operation commenced in September 2017, and verification sampling was conducted in January/February 2018. An estimated contaminant mass of 1,500 kg of chlorinated solvents was extracted over 4.5 months of operating time. The maximum extraction rate was ~100 kg/day. Temperature development and extracted mass was monitored online over the duration to help determine when verification samples should be performed. See illustrations at <http://miracl.com/thermal-pce-remediation-equipment-at-site-faergaren-being-installed/>.

PHYTOREMEDIATION AT RYELAND ROAD ARSENIC SITE, HEIDELBERG TOWNSHIP, PA

U.S. EPA Superfund Site Web Page, accessed November 2018

The 7.3-acre Ryeland Road Arsenic site is located in Berks County, Pennsylvania. Past operations contaminated soil and groundwater on part of the property with arsenic, lead, and other chemicals. In addition to excavation and removal of contaminated materials, a pilot study initiated in May 2007 determined that phytoremediation by ferns was a successful method to reduce arsenic in shallow soils and areas saturated by springs. Full-scale efforts have been ongoing since 2009. The ferns have demonstrated their effectiveness in over 30% of the area where arsenic contamination once existed along the stream. <https://cumulis.epa.gov/superpad/cursites/csitinfo.cfm?id=0301755> See additional information on this site at https://www.fws.gov/northeast/pafo/pdf/contaminants/Ryeland_Road.pdf

Demonstrations / Feasibility Studies

REMEDICATION OF TCE-CONTAMINATED GROUNDWATER USING KMNO₄ OXIDATION: LABORATORY AND FIELD-SCALE STUDIES

Yang, Z.H., J.H. Ou, C.D. Dong, C.W. Chen, W.H. Lin, and C.M. Kao.
Environmental Science and Pollution Research [Publication online 19 Sept 2018 prior to print]

Objectives were to conduct laboratory bench and column experiments to determine the oxidation kinetics and optimal operational parameters for TCE-contaminated groundwater remediation using potassium permanganate (KMnO₄) as oxidant and then to conduct a pilot-scale study to assess the efficiency of TCE remediation by KMnO₄ oxidation. Results show that a significant amount of KMnO₄ was depleted when it was added in a soil/water system due to the existence of natural soil organic matter. The effective influence zone of the KMnO₄ oxidation was limited to within a 3-m radius of the injection area. To retain a higher TCE removal efficiency, a continuous supplement of high concentrations of KMnO₄ is required.

FIELD DEMONSTRATION OF FOAM INJECTION TO CONFINE A CHLORINATED SOLVENT SOURCE ZONE

Portois, C., E. Essouayed, M.D. Annable, N. Guiserix, A. Joubert, O. Attea.
Journal of Contaminant Hydrology 214:16-23(2018)

The foam's purpose was to reduce dissolved contaminant release to the aquifer by diverting groundwater flow that would normally enter the source area. During the demonstration, the foam was pre-generated and directly injected to surround the chlorinated solvent source zone. Measurements and modeling allowed definition of the foam extent surrounding each injection point, which appeared to be the critical metric to define the success of the foam injection approach. Information on the transport of chlorinated solvents in groundwater showed a decrease of contaminant flux by a factor of 4.4 downstream of the confined area. Effective permeability reduction was maintained over a period of three months.

ACTIVATED CARBON THIN-LAYER PLACEMENT AS AN IN SITU MERCURY REMEDIATION TOOL IN A PENOBSCOT RIVER SALT MARSH

Gilmour, C., T. Bell, A. Soren, G. Riedel, G. Riedel, K. Kopec, D. Bodaly, and U. Ghosh.
Science of the Total Environment 621:839-848(2018)

The study was a 2-year, fully crossed small pilot study, with four treatments (activated carbon [AC], biochar, ferrous chloride, and lime) and unamended controls at two sites. Porewater methylmercury (MeHg) concentrations were the main endpoint, with impacts on sediment biogeochemistry as a secondary study goal. AC-based SediMite™ reduced MeHg, and to a lesser extent total Hg, in surficial pore waters. AC reduced MeHg concentrations by >90% after one month and continued through about a year. For total Hg, AC yielded about a 70% reduction at one month and 50-65% reduction at 8 months. Biochar provided lower and more variable reduction in porewater MeHg but was not effective in reducing total Hg. Biochar amendment also increased soil MeHg. Neither ferrous chloride nor lime amendments reduced porewater Hg or MeHg levels. About 50% of AC treatment applied as SediMite pellets was retained in marsh soils after one year. For additional information, see Chapter 19 in the Penobscot River Mercury Study at http://www.penobscotmercurystudy.com/documents/court-orders/652-phase-ii-final-report_chapter19.pdf.

Research

LOW-TEMPERATURE THERMAL REMEDIATION: GAINING TRACTION AS A GREEN REMEDIAL ALTERNATIVE

Horst, J., C. Flanders, M. Klemmer, D.S. Randhawa, and D. Rosso.
Groundwater Monitoring & Remediation 38(3):18-27(2018)

Increases in temperature—even those at

THERMAL MONITORING OF NATURAL SOURCE ZONE DEPLETION

Askarani, K.K., E.B. Stockwell, K.R. Piontek, and T.C. Sale.
Groundwater Monitoring & Remediation 38(3):43-52(2018)

Natural depletion of subsurface petroleum liquids releases energy in the form of heat. The rate of natural source zone depletion (NSZD) can be derived from subsurface temperature data. An energy balance was performed to resolve NSZD-generated energy in terms of W/m², followed by resolution of biodegradation rates by dividing the NSZD energy by the heat of reaction in joules/mol. Temperature data were collected using data loggers, wireless connections, and automated data storage and analysis. Continuous thermal resolution of monthly NSZD rates at a field site indicated that apparent monthly NSZD rates vary through time, ranging from 10,000 to 77,000 L/ha/yr. Temporal variations in observed apparent NSZD rates were attributed to processes governing the conversion of methane (CH₄) to CO₂, as opposed to the actual rates of NSZD. Given a year or more of continuous NSZD rate data, positive and negative biases in apparent NSZD rates are expected average out, and average apparent NSZD rates will converge to true NSZD rates. An 8.4% difference between average apparent NSZD rates over a 31-month period using the thermal monitoring method and seven rounds of CO₂ efflux measurements using CO₂ traps supported the validity of both CO₂ trap and thermal monitoring methods. See additional information in 57 slides at http://raep.memberclicks.net/assets/uncbeon/2016/gsi_thermalnszd_raep_9-17-16.pdf.

EFFECTIVE REMOVAL OF MERCURY FROM AQUEOUS STREAMS VIA ELECTROCHEMICAL ALLOY FORMATION ON PLATINUM

Tunso, C. and B. Wickman.
Nature Communications 9:Article 4876(2018)

Under applied potential, Hg ions in solution form a stable PtHg₄ alloy with platinum (Pt) on the cathode. A 100-nm Pt film was fully converted to a layer of PtHg₄ 750 nm thick. The overall removal capacity was >88 g Hg/cm³. The electrodes were easily regenerated after use. This technique allowed efficient and selective decontamination in a wide pH range for processing industrial, municipal, and natural waters. The method is suited for both high and low Hg concentrations and can reduce mercury levels far below the limits allowed in drinking water. <https://www.nature.com/articles/s41467-018-07300-z>.

FIELD-SCALE HETEROGENEITY AND GEOCHEMICAL REGULATION OF ARSENIC, IRON, LEAD, AND SULFUR BIOAVAILABILITY IN PADDY SOIL

Fang, W., P.N. Williams, X. Fang, C. Amoah-Antwi, D. Yin, G. Li, L.Q. Ma, and J. Luo.
Environmental Science and Technology 52(21):12098-12107(2018)

A method designated PADDI uses a miniaturized arrayed diffusive gradients-in-thin-films (DGT) probe for high-frequency in situ sampling with LA-ICPMS and CID analysis to measure the field-scale heterogeneity of trace-element bioavailability. Bioavailability was shown to vary significantly as determined from 864 microgel measurements housed within 72 PADDI arrays. Porewater As measurements were unable to differentiate the top/rhizosphere and bulk/deeper-soil layers, whereas dynamic sampling with DGT revealed significant differences. Arsenic bioavailability was stable laterally across the field but varied with depth, in contrast to the trends for Pb. Due to the high frequency of hotspot maxima discretely dispersed across the paddy, heterogeneity in Pb bioavailability proved the most difficult to simulate, requiring the greatest number of probe deployments to determine a reliable field average.

FRAMEWORK FOR DETERMINING OPTIMAL STRATEGY FOR SUSTAINABLE REMEDIATION OF CONTAMINATED SEDIMENT: A CASE STUDY IN NORTHERN TAIWAN

Zheng, Z.J., M.Y. Lin, P.T. Chiueh, and S.L. Lo.
Science of the Total Environment 654:822-831(2018)

A comprehensive assessment framework based on the concept of green and sustainable remediation was applied to determine the best alternative for managing sediments contaminated with heavy metals in a river in Northern Taiwan. Results of the pre-remediation human-health risk assessment indicated an unacceptably high cancer risk to children, while the cost-benefit analysis suggested that remediation was economically feasible. The results of multi-criteria decision analysis revealed that a strategy involving in situ capping with anthracite-based activated carbon would be relatively inexpensive and result in low risk to human health, while having a higher environmental impact and greater public acceptance as compared to a method involving the dredging and washing of soil. Thus, in situ capping using anthracite-based activated carbon was identified as the preferable remediation alternative from multiple perspectives.

COMBINED USE OF ZERO VALENT IRON AND MAGNETIC SEPARATION FOR EX-SITU REMOVAL OF BIOAVAILABLE METALS FROM CONTAMINATED SEDIMENTS

Feng, N., H. Ghoveisi, A. Boularbah, G. Bitton, and J.-C.J. Bonzongo.
Soil and Sediment Contamination: An International Journal 27(2):131-146(2018)

Sandy and organic sediments characterized by different heavy metal binding capacities (HMBC), and contaminated with Cu, Hg, or Zn were treated ex situ using a remediation approach consisting of (i) sorption onto oxidized zero-valent iron (ZVI) surfaces and (ii) retrieval of formed metal-ZVI complexes from sediment matrices by magnetic separation. The research focused on the reduction/elimination of the bioavailable fractions of metals. The efficiency of the method was assessed by a combination of a bacterial (MetPLATE™) and invertebrate-based (48-h *Ceriodaphnia dubia*) bioassays. In sandy sediments, characterized by low HMBC (20.8, 23.5, and 39.6 for Hg, Cu, and Zn, respectively), the determined toxicity units (TU) prior to sediment treatment increased in the order Hg < Cu < Zn, regardless of the bioassay used. Using ZVI and magnetic separation in the sandy sediments achieved up to 97% TU reduction. In organic-rich sediments, the fineness of the studied metals for organic matter resulted in much higher HMBC values (83.9, 108.3, and 136.2 for Cu, Zn, and Hg, respectively) and much lower TU values before sediment treatment with ZVI. The use of MetPLATE on non-treated sediments resulted in TU values increasing in the order Hg < Cu < Zn, with TU removal efficiencies ranging from 83-97% after treatment. The TU values measured with the 48-h *C. dubia* assay were higher than those obtained with MetPLATE, and in this case, sediments contaminated with Zn exhibited the lowest percentage of TU removal, with only 81.7% and 80.5% TU removal for sediments with contamination levels of 400 and 800 mg/kg, respectively. For organic sediments contaminated with Cu and Hg, TU removal exceeded 95%.

OPTIMIZATION OF EXTRACTION METHODS FOR COMPREHENSIVE PROFILING OF PERFLUOROALKYL AND POLYFLUOROALKYL SUBSTANCES IN FIREFIGHTING FOAM IMPACTED SOILS

Munoz, G., P. Ray, S. Mejia-Avendano, S.V. Duy, D.T. Do, J. Liu, and S. Sauve.
Analytica Chimica Acta 1034:74-84(2018)

Data from different lines of evidence indicate that current extraction procedures previously validated with anionic and neutral PFASs may seriously underperform for cationic and zwitterionic PFASs. The extraction efficiency and incremental response could be strongly matrix-dependent, which might preclude a robust analysis. In a study of a sample preparation procedure for the analysis of anionic, cationic, and zwitterionic PFASs in soil samples, 86 PFASs were evaluated, representing 24 chemical classes associated with aqueous film-forming foam (AFFF) formulations. Methanol with hydrochloric acid provided excellent recoveries for most cationic and zwitterionic PFASs, including fluorotelomer sulfonamidoalkyl betaines (e.g., 6:2 FTAB) and fluorotelomer betaines (e.g., 9:1:2 FTB), yet performed less satisfactorily for certain anionic PFASs and possibly caused conversion of some PFASs. Sequential extractions using methanol with ammonium acetate exhibited limited matrix effects and suitable recoveries of PFASs from soils of diverse textural classes and organic matter content.

TRANSFORMATION OF NOVEL POLYFLUOROALKYL SUBSTANCES (PFAS) AS CO-CONTAMINANTS DURING BIOPILE REMEDIATION OF PETROLEUM HYDROCARBONS

Li, R., G. Munoz, J. Liu, S. Sauve, S. Ghoshal, and J. Liu.
Journal of Hazardous Materials 362:140-147(2019)

The environmental behaviors of PFASs in engineered biopile treatment facilities were investigated by monitoring PFASs derived from aqueous film-forming foam (AFFF) under three nutrient conditions. The influence of nutrient levels on degradation kinetics and efficiency was found to vary between the hydrocarbons and PFASs and among individual PFASs. A high number of compounds, including zwitterionic polyfluoroalkyl betaines aged in the field for two years, were biotransformed continuously in lab reactors, demonstrating their slow kinetics and environmental persistence. The low yield to perfluoroalkyl carboxylates suggests that processes such as the formation of bound residues or irreversible sorption might play a major role in reducing detectable levels of zwitterionic PFASs. The high persistence of betaines was further confirmed by the behaviors of a freshly spiked sulfonamide betaine. The study demonstrated complex chemical dynamics in AFFF-impacted soils and the challenges for predicting PFAS fate in soil biopiling facilities.

DEVELOPMENT OF ENVIRONMENTAL HEALTH CRITERIA FOR INSENSITIVE MUNITIONS (IMX-101-104)

Lent, E.M., A.M. Jackovitz, D.A. Pillard, A. Kennedy, and M.S. Johnson.

New energetic formulations are being developed to provide for insensitive munitions. The objective of this work was to provide focused toxicity information for constituents of IMX-101—NTO and DNAN—that will allow for more accurate benchmark derivation consistent with existing regulatory guidance and frameworks and allow for optimal operational flexibility at ranges while ensuring environmental health. Acute and chronic DNAN aquatic toxicity data suggest that DNAN is slightly less toxic than other nitroaromatics, such as TNT. Media-based concentrations were developed for soil and drinking water based on project results and other data. *See this report and other project documents at [https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminants-on-Ranges/Characterizing-Fate-and-Transport/ER-2223/ER-2223/\(modified\)/05Oct2018](https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminants-on-Ranges/Characterizing-Fate-and-Transport/ER-2223/ER-2223/(modified)/05Oct2018).*

NATURAL BACKGROUND AND ANTHROPOGENIC ARSENIC ENRICHMENT IN FLORIDA SOILS, SURFACE WATER, AND GROUNDWATER: A REVIEW WITH A DISCUSSION ON PUBLIC HEALTH RISK

Missimer, T.M., C.M. Teaf, W.T. Beeson, R.G. Maliva, J. Woolschlager, and D.J. Covert.
International Journal of Environmental Research and Public Health 15(10):2278(2018)

Florida geologic units and soils contain a wide range of concentrations of naturally occurring arsenic. The average range of bulk rock concentrations is 1-13.1 mg/kg, with concentrations in accessory minerals >1000 mg/kg. Florida soils contain natural As concentrations that can exceed 10 mg/kg in some circumstances, with organic-rich soils often having the highest concentrations. Anthropogenic sources of As have added about 610,000 metric tons of As into the Florida environment since 1970, thereby increasing background concentrations in soils. Anthropogenic sources of As in soils include pesticides, fertilizers, chromated copper arsenate-treated wood, soil amendments, cattle-dipping vats, chicken litter, sludges from water treatment plants, and others. The default soil cleanup target level in Florida for As in residential soils is 2.1 mg/kg, which is below some naturally occurring background concentrations in soils and anthropogenic concentrations in agricultural soils. A review of risk considerations shows that adverse health impacts associated with As exposure are dependent on many factors and that the Florida cleanup levels are very conservative. *This paper is Open Access at <https://www.mdpi.com/1660-4601/15/10/2278/htm>.*

THE REDUCTION OF Cr(VI) TO Cr(III) MEDIATED BY ENVIRONMENTALLY RELEVANT CARBOXYLIC ACIDS: STATE-OF-THE-ART AND PERSPECTIVES

Jiang, B., Y. Gong, J. Gao, T. Sun, Y. Liu, N. Oturan, and M.A. Oturan.
Journal of Hazardous Materials 365:205-226(2018)

Mechanisms of Cr(VI) reduction are mainly associated with the coordination of carboxylic acids (CAs) with surface-bound/dissolved metals or Cr(VI, V, IV) species and the electron donating abilities of CAs. The general decays of intermediate Cr(V, IV) complexes emerge in the Cr(VI) reduction processes. From the study survey presented, CAs-mediated Cr(VI) reduction processes exhibit good potential for remediation of various Cr(VI)-contaminated waters/sites, but the need remains to address the remaining bottlenecks and challenges for remediation of Cr(VI) mediated by CAs in related cases of natural attenuation and treatment of industrial effluents.

General News

EPA SEEKS PUBLIC INPUT ON DRAFT TOXICITY ASSESSMENTS FOR PFAS CHEMICALS

U.S. EPA is seeking public input on draft toxicity assessments for GenX chemicals and perfluorobutane sulfonic acid (PFBS), members of a larger group of per- and polyfluoroalkyl substances (PFASs). PFASs are man-made chemicals used in a wide range of products because of their ability to repel water, grease, and oil. These draft assessments are part of EPA's efforts to increase the amount of research and information that is publicly available on chemicals in the PFAS family. To develop the draft toxicity assessments, the agency relied on the best available science, including input from independent peer reviewers. The agency also engaged with federal and state partners throughout the development of the draft assessments. EPA published a request for comments in the Federal Register of November 21, 2018, and the Agency will accept public comments on the GenX chemicals and PFBS draft toxicity assessments for a period of 60 days, which ends January 22, 2019. EPA then will consider the public comments, revise the documents, and consider the need for additional review, as appropriate. More information is posted at <https://www.epa.gov/pfas/genx-and-pfbs-draft-toxicity-assessments>.

AQUEOUS FILM-FORMING FOAM

Interstate Technology & Regulatory Council (ITRC), 12 pp, 2018

Aqueous film-forming foam (AFFF) is highly effective foam intended for fighting high-hazard flammable-liquid fires. AFFF products typically are formed by combining hydrocarbon foaming agents with fluorinated surfactants. The purpose of this fact sheet is to outline how to properly identify, handle, store, capture, collect, manage, and dispose of AFFF. The fact sheet is not intended to replace manufacturer specifications or industry guidance for AFFF use, or to discuss alternatives in detail. It is only intended to educate users on AFFF use to reduce and eliminate potential harm to human health and the environment. https://pfas-1.itrcweb.org/wp-content/uploads/2018/10/pfas_fact_sheet_fff_10_3_18.pdf

POLYCHLORINATED BIPHENYLS: SOURCES, FATE, EFFECTS ON BIRDS AND MAMMALS, AND MECHANISMS OF ACTION

Bohannon, M.E.B. and M.A. Ottinger.
Elsevier, Oxford. The Encyclopedia of the Anthropocene 5:207-213(2018)

PCBs comprise a group of organic compounds that have been persistent and widespread pollutants in the 20th and 21st centuries. PCBs have been shown to have multiple deleterious effects in wildlife. This article focuses on how PCBs have entered the environment, the organic and inorganic matrices they move into, the biological effects they have on wildlife and mammalian health, and the main mechanisms of action by which PCBs exert those effects. Two case studies of PCB contamination are considered in this article along with the effects wrought by PCBs at a cellular and molecular level.

TPH RISK EVALUATION AT PETROLEUM-CONTAMINATED SITES

Interstate Technology & Regulatory Council (ITRC), Web-based Document, TPHRisk-1, 2018

Petroleum release site risk evaluation presents complex and unique challenges to site managers, risk assessors, regulators, and other stakeholders. Mischaracterizing risks associated with total petroleum hydrocarbon (TPH) contamination can lead to unnecessary cleanups, inappropriate property use limitations, or inadequate protection of human health and ecological receptors. Once released to the environment, petroleum contamination changes over time and space due to natural and anthropogenic weathering processes. Although traditional indicator compounds (e.g., BTEX and naphthalene) may be present below levels of concern in affected media, unidentified petroleum fractions or degradation products (metabolite compounds) could pose unexamined risks. Summarizing approaches to evaluate this topic in more detail is one of the primary objectives of this document. The guide was developed to discuss the unique properties of TPH and provide the tools, techniques, and lessons learned to improve risk characterization and support better-informed risk management decisions at TPH sites. <https://tphrisk-1.itrcweb.org/>

OVERVIEW OF STATE APPROACHES TO VAPOR INTRUSION: 2018

Eklund, B., L. Beckley, and R. Rago.
Remediation 28(4):23-35(2018)

Regulatory requirements for the evaluation of vapor intrusion vary significantly among states. For site owners and responsible parties that have sites in different regulatory jurisdictions, one challenge is to know and understand how the requirements or expectations for vapor intrusion differ from one jurisdiction to the next. Differences in requirements can make it difficult to manage sites in a consistent manner across jurisdictions. This article provides an update to the 2012 study to include revised and new guidance. For each state, the review presents tabulations of the types of screening values included (e.g., groundwater, soil, soil gas, indoor air) and the screening values for selected chemicals that commonly drive vapor intrusion investigations (i.e., TCE, PCE, and benzene) along with other compounds of potential interest. In addition, the article summarizes for each state key policy decisions that are important for the investigation of vapor intrusion, including distance screening criteria, default subsurface-to-indoor-air attenuation factors, mitigation criteria, and policies for evaluation of short-term TCE exposure. *See additional information in 27 slides at [http://iavi.rti.org/attachments/WorkshopsAndConferences/01_Eklund%20AHE%202018%20-%20Overview%20of%20State%20VI%20Approaches%20\(Rev2\).pdf](http://iavi.rti.org/attachments/WorkshopsAndConferences/01_Eklund%20AHE%202018%20-%20Overview%20of%20State%20VI%20Approaches%20(Rev2).pdf).*

DIOXINS AND FURANS: A REVIEW FROM CHEMICAL AND ENVIRONMENTAL PERSPECTIVES

Kanan, S. and F. Samara.
Trends in Environmental Analytical Chemistry 17:1-13(2018)

This review encompasses the historical presence of polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs) in the worldwide environment. Information on exposure indicates that the main route of exposure of dioxins/furans to humans is through ingestion. This review presents a thorough assessment of sampling, methods for extraction, and analysis as well as the photodegradation of dioxins under various conditions. Extraction methods, including USEPA 8290, are the most frequently used methods, with high-resolution gas chromatography/high-resolution mass spectrometry preferred as a detection tool. A detailed compilation of studies of the PCDD/F concentrations and environmental sources from major industrial regions in several countries is presented. The major sources of dioxins in the worldwide environment include combustion and industrial sources.

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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