

# Technology Innovation News Survey

## Entries for February 1-15, 2021

### Market/Commercialization Information

#### PADUCAH GASEOUS DIFFUSION PLANT DEACTIVATION & REMEDIATION

Dept of Energy, Environmental Management Consolidated Business Center, Cincinnati, OH.  
Contract Opportunities at Beta.SAM, Solicitation 89303321NEM000028, 2021

DOE's Office of Environmental Management is currently in the acquisition planning stage of potential contract award for the completion of the Paducah Gaseous Diffusion Plant (GDP) Deactivation and Remediation (D&R) Project, including deactivation and waste disposal for GDP facilities process equipment, related process buildings, and other GDP facilities. The purpose of this sources sought is to solicit input via capability statements from interested parties under NAICS code 562910 with the specialized capabilities necessary to meet all of the major elements of scope for the potential upcoming competitive procurement. Additional information will be provided at the GDP D&R procurement website at <https://www.emmcr-doe.gov/55F8/padgdnr/>. Capability statements and questions pertaining to this announcement are due by 5:00 PM ET on March 24, 2021. <https://beta.sam.gov/opp/ch9d31h9a3874hc28ea182172-78907h/view>

#### SMALL BUSINESS ENVIRONMENTAL REMEDIATION SERVICES MULTIPLE AWARD TASK ORDER CONTRACT

U.S. Army Corps of Engineers, Kansas City District, Kansas City, MO.  
Contract Opportunities at Beta.SAM, Solicitation W912DQ21R3003, 2021

This RFP is a total small business set-aside for an IDIQ MATOC (multiple-award task-order contract) having a target of five awardees for environmental remediation services (ERS). The NAICS code is 562910. The ERS will support work assigned to the USACE Northwestern Division and U.S. EPA Region 2 for hazardous, toxic and radioactive waste remediation projects for both civilian and military agencies of the federal government. Performance will encompass a wide range of environmental remedial services at hazardous and radiological waste sites. The maximum value for all orders issued against the contract is \$60M. Offers are due by 4:30 PM CT on April 1, 2021. <https://beta.sam.gov/opp/72feeaa4e48d4ff98eac3c5c17173d8/view>

#### EMERGENCY OIL AND HAZARDOUS SUBSTANCE/HAZARDOUS WASTE (OHS) SPILL RESPONSE, SAMPLING AND CLEANUP SERVICES

Naval Facilities Engineering Systems Command (NAVFAC) Southwest, San Diego, CA.  
Contract Opportunities at Beta.SAM, Solicitation N6247321S3590, 2021

This sources sought notice is for market research and planning purposes only to identify potential SBA-certified HUBZone; 8(a); service-disabled veteran-owned; woman-owned; economically disadvantaged woman-owned; and other small business concerns under NAICS code 562910 that are capable of providing Emergency Oil and Hazardous Substance/Hazardous Waste (OHS) spill response, sampling and cleanup services. NAVFAC Southwest is seeking potential sources for these environmental services for U.S. Navy and Marine Corps bases and BRAC installations predominantly located in states within the NAVFACSWSCOM Southwest area of responsibility, including California, Arizona, Nevada, Washington and Oregon. Interested firms are invited to submit brief (3 pages max) statements of interest and capability via email by 1:00 PM ET on April 2, 2021. <https://beta.sam.gov/opp/72feeaa4e48d4ff98eac3c5c17173d8/view>

#### ENVIRONMENTAL SERVICES, ST. LOUIS DISTRICT, CORPS OF ENGINEERS (USACE)

U.S. Army Corps of Engineers, St. Louis District, St. Louis, MO.  
Contract Opportunities at Beta.SAM, Solicitation W912P921R0026, 2021

This requirement is set-aside 100% for small business for a 5-year IDIQ MATOC (multiple-award task-order contract) to provide Environmental Consulting Services for the USACE-St. Louis District under NAICS code 541620. The Government aims to award up to three contracts for this MATOC. The maximum value for all orders issued against the contract is \$49M. Environmental tasks include but are not limited to (1) Environmental consultation and assessments; (2) Industrial hygiene surveys and associated tasks; (3) HTRW-related assessments, program tasks, remediation and restoration; (4) Contamination-related water quality assessments; and (5) Other environmental/HTRW tasks. Offers are due by 12:00 noon CT on April 2, 2021. <https://beta.sam.gov/opp/1bh977cd517e4425aed477dc5ea2478a/view>

#### \$60M 8(A) SET-ASIDE ENVIRONMENTAL CONSULTING SERVICES (ECS) MULTIPLE AWARD TASK ORDER CONTRACT (MATOC) FOR OMAHA DISTRICT

U.S. Army Corps of Engineers, Tulsa District, Tulsa, OK.  
Contract Opportunities at Beta.SAM, Solicitation W9128F20R0069, 2021

This solicitation is for an IDIQ multiple-award task-order contract (MATOC) 8(a) set-aside under NAICS Code 541620 in support of the USACE Northwestern Division and existing customers. The intent is to award a target of three contracts under this MATOC for a basic ordering period of three years plus one two-year option period or until the \$60M MATOC limit is reached, whichever comes first. The work encompasses the DoD Sustainable Range Program; Natural Resource Management Program; Environmental Support for Others Program; support to U.S. EPA; control of environmental contamination from pollutants, toxic substances, radioactive materials, and hazardous materials; environmental compliance and restoration; natural, historical and cultural resource management; environmental stewardship; environmental sustainability; and all other environmental related regulatory programs. Offers are due by or before 2:00 PM CT on April 12, 2021. <https://beta.sam.gov/opp/8525809ech7457f8bb17ea002294de6/view>

#### TRITIUM SYSTEMS DEMOLITION AND DISPOSAL

Princeton Plasma Physics Laboratory - DOE Contractor, Princeton, NJ.  
Contract Opportunities at Beta.SAM, Solicitation RFP20-125C, 2021

This procurement is unrestricted under NAICS code 562910. Princeton Plasma Physics Laboratory (PPPL), a National Laboratory and DOE Prime Contractor, requires demolition and disposal of tritium systems and equipment from PPPL, located at 100 Stellarator Road, James Forrestal Campus, U.S. Route 1 North, Plainsboro, NJ. PPPL will apply radiological controls based on surveys performed in-house; however, Contractor will be responsible for safe removal, characterization not previously performed by PPPL, waste packaging, transportation, and disposal of the equipment specified in the Statement of Work. The magnitude of this procurement is between \$12M and \$22M inclusive of Option Items. The full solicitation is available at <https://sites.google.com/pppl.gov/procurement/oppnotices> under RFP 20-125C. Proposals are due by 4:00 PM ET on April 16, 2021. <https://beta.sam.gov/opp/caf4883649d94b45ab915f499e06ec5/view>

### Cleanup News

#### PROMOTING REDUCTIVE DECHLORINATION OF CHLORINATED ETHENES IN GROUNDWATER VIA BIOSTIMULATION

LaPat-Polasko, L. | Global Enviro Summit, 1-3 September, virtual, abstract only, 2020

An in situ bioremediation (ISB) system was used to biostimulate reductive dechlorination of chlorinated ethenes in groundwater in combination with bioaugmentation in source areas. Two distinct plumes contain >10 mg/L of various chlorinated volatile organic compounds cVOCs; the western plume also contains elevated levels of 1,4-dioxane. A recirculation well was installed in each plume to promote biostimulation with an emulsified oil substrate and bioaugmentation with *Dehalococcoides* microbial consortium and *Pseudonocardia dioxanivorans*. Within two months after the injection, groundwater monitoring showed a significant decline in ORP levels to less than -150 millivolts, and the *Dehalococcoides* population and key enzymes significantly increased in downgradient wells. Groundwater geochemistry indicated that competing electron acceptors were reduced, and conditions were suitable for reductive dechlorination. Dioxane levels are being evaluated post the bioaugmentation event.

#### EX SITU REMEDIATION OF SEDIMENT FROM SERBIA USING A COMBINATION OF ELECTROKINETIC AND STABILIZATION/SOLIDIFICATION WITH ACCELERATED CARBONATION TREATMENTS

Popov, N., S. Roncevic, N. Dudukovic, D. Krmar, Z. Mihaljev, M.Z. Balos, and S. Dordievski.  
Environmental Science and Pollution Research [Published 22 November 2020 prior to print]

Three ex situ remediation technologies were applied to Begej River sediments. Conventional electrokinetic treatment (EK) was implemented first to reduce the amount of contaminated sediment and enhance metals accumulation, followed by stabilization/solidification (S/S) to immobilize the accumulated metals. Two types of bio immobilizing agents were used. Following treatments, sequential extraction procedure (SEP) and TCLP and DIN 3841-4 S4 leaching tests were used to assess risk. EK treatment reduced the amount of polluted sediment by half. TCLP and SEP performed on S/S mixtures after a 28-day maturation period indicated that accelerated carbonation decreased the mobility of critical metals. Moreover, based on the leaching tests, all prepared mixtures were categorized as non-hazardous and safe for disposal according to the relevant Serbian regulations.

#### FIVE-YEAR ENHANCED NATURAL ATTENUATION OF HISTORICALLY COAL-TAR-CONTAMINATED SOIL: ANALYSIS OF POLYCYCLIC AROMATIC HYDROCARBON AND PHENOL CONTENTS

Telesinski, A. and A. Kiepas-Kokot.  
International Journal of Environmental Research and Public Health 18:2265(2021)

The objective of this study was to assess soil pollution on land where coal-tar was processed for over 100 years and assess the subsequent decline in the content of phenols and polycyclic aromatic hydrocarbons (PAHs) during enhanced natural attenuation. A 2015 study conducted did not reveal any increase in heavy metals, monoaromatic hydrocarbons (BTX), and cyanides. However, the content of PAHs and phenols was higher than permitted by Polish norms in force until 2016. Repeated analyses for phenols and PAHs in 2020 showed that enhanced natural attenuation has efficiently degraded the simplest substances-phenol and naphthalene. The three- and four-ring hydrocarbons were degraded at a lower intensity. The mean decrease in content after 5-year enhanced natural attenuation were in the following order: phenols>naphthalene>phenanthrene>fluoranthene>benzo(a)anthracene>chrysene>anthracene. <https://www.mdpi.com/1660-4601/18/5/2265/pdf>

#### RICKER PLUME ANALYTICS TOOLS FOR ACHIEVING SUSTAINABLE REMEDIATION OBJECTIVES

Ricker, J.A. | Sustainable Remediation Forum Webinar, 24 August, 55 minutes, 2020

Ricker Plume Analytics Tools, or Groundwater Plume Analytics®, were developed to help demonstrate that passive natural remedies. They help communicate meaningful patterns in groundwater data and rely primarily on graphical displays to communicate insight into groundwater plume behavior. The presentation highlights the transition from pump and treat to MNA for a CVOC plume at a Superfund site in Hamilton, Ohio. The pump and treat system consisting of 25 extraction wells operated from 1987 to 2015. The system was shut down as part of a pilot test to evaluate the efficacy of MNA as a final remedial action for the remaining CVOC plume. The presentation reviews the analyses used to demonstrate that MNA is sufficient for continued remediation of the plume as well as the resulting reduction of environmental footprint metrics. <https://www.youtube.com/watch?v=sdRvX4ldA7U>

#### TRIAD-APPROACH (LIF/MIP/MWS/SVPS) FOR LNAPL AND PHC DELINEATION AT A FUEL STATION ON PEELE ISLAND

Jones, L. | Smart Remediation, 4 February, virtual, 14 slides, 2021

A 6-day site investigation in 2018 at a long-term fueling (gasoline and diesel), storage, and transfer facility was conducted to better understand the nature and extent of petroleum hydrocarbon (PHC) impacts, assess potential risks, and guide the next steps for site remediation. A triad-approach was implemented using laser-induced fluorescence to define the extent of LNAPL, membrane interface probe to infer the extent of dissolved phase PHC impacts, monitoring wells to serve as sentinel/delineation points, and soil vapor probes/implants to assess potential vapor intrusion risks to nearby buildings. <https://2ziaphnm3zh1x23mj335vjxt-wpengine.netdna-ssl.com/wp-content/uploads/2021/01/SMART-Remediation-Virtual-Session-1-Feb-4-2021-Laura-Jones.pdf>

## Demonstrations / Feasibility Studies

### IN-SITU IMMOBILIZATION OF CADMIUM-POLLUTED UPLAND SOIL: A TEN-YEAR FIELD STUDY

Wang, G., Q. Zhang, W. Du, R. Lin, J. Li, F. Ai, Y. Yin, R. Ji, X. Wang, and H. Guo. *Ecotoxicology and Environmental Safety* 207:11275(2021)

A 10-year experiment evaluated the long-term stability of lime, silicon fertilizer (SF), fused calcium magnesium phosphate fertilizer (FCMP), bone charcoal, steel slag, and blast furnace slag after a one-time application in a Cd-polluted agricultural field. SF and FCMP amendments, in particular, were lead to high Cd immobilization by increasing the soil pH and decreasing the soil acid-extractable Cd content, conditions closely associated with Cd uptake by *Artemisia selengensis*. In addition, SF and FCMP application altered the soil microbial structure and stimulated metabolism pathways, including amino acid, carbohydrate, and lipid metabolism. The results suggested that SF and FCMP are stable at 1%, are potentially suitable for long-term Cd immobilization, and provide a strategy to mitigate the risk of food product contamination in heavy-metal-polluted soil.

### IN SITU GEOCHEMICAL STABILIZATION (ISGS) OF DNAPL

Gray, D. | Global Enviro Summit, 1-3 September, virtual, abstract only, 2020

A bench-scale study and a field pilot test were conducted to assess the reactivity and performance of several ISGS formulations using site-specific material. Site-specific soil and groundwater were used in the bench-scale study in both batch and column reactors. The field-scale pilot consisted of a 5600 ft<sup>2</sup> and 10 ft thick treatment area within a known and delineated area of DNAPL in the subsurface. Similar testing was completed for both studies, along with additional evaluation of radius of influence and field implementability for the pilot. The bench study results indicated hydraulic conductivity reduction of up to 2-3 orders of magnitude, concentration reductions of VOC and SVOC constituents in the DNAPL, and reduced mass diffusion from the DNAPL to dissolved phase. Field pilot data indicated reductions in hydraulic conductivity of 1-2 orders of magnitude and in DNAPL thickness in the treatment grid, as well as compositional changes in both the DNAPL and groundwater.

### IN SITU BIOREMEDIATION OF THE SOURCE ZONE FOR CHLORINATED SOLVENTS IN GROUNDWATER — SUCCESSES AND CHALLENGES

LaPat-Polasko, L. and M. Hayes. | Environmental Professionals of Arizona 16th Annual Gatekeeper Regulatory Roundup, 4-5 March, Tempe, AZ, 37 slides, 2020

Two separate VOC plumes, one with low 1,4-dioxane and one with high 1,4-dioxane, are present at a former manufacturing company. Following decades of operation, a pump and treat system was found to have little impact on the source area and downgradient plumes, and current activities at the site require a remedial approach that does not disrupt operations. This presentation summarizes the site geology, groundwater data, soil microbial data, and in situ testing that led to the decision to test biostimulation followed by bioaugmentation in the source zone. Monitoring results as well as Bio-Trap and in situ microcosm studies suggest that bioaugmentation using *Pseudonocardia dioxanivorans* CB1190 may be appropriate for in situ biodegradation of dioxane at the site. Preparations are starting for field implementation. [https://www.epa.gov/assets/docs/conference/2020/2020Proceedings/2020EPA7\\_P1\\_R03\\_2\\_LaPat-Polasko.pdf](https://www.epa.gov/assets/docs/conference/2020/2020Proceedings/2020EPA7_P1_R03_2_LaPat-Polasko.pdf) For more information on the 7th Avenue & Bethany Home site, see <http://www.azdeg.gov/node/373>

### BENZENE DEGRADATION IN CONTAMINATED AQUIFERS: ENHANCING NATURAL ATTENUATION BY INJECTING NITRATE

Muller, C., K. Knoller, R. Lucas, S. Kleinsteuber, R. Trabiszsch, H. Weiß, R. Stollberg, H.H. Richnow, and C. Vogt.

*Journal of Contaminant Hydrology* 238:103759(2021)

A field experiment was conducted to stimulate benzene biodegradation by injecting nitrate (NO<sub>3</sub><sup>-</sup>) into a sulfidic benzene plume. The experiment aimed to recycle sulfate by nitrate-dependent sulfide oxidation and use NO<sub>3</sub><sup>-</sup> as direct electron acceptor for benzene oxidation. Over 60 days, 6.74 tons of sodium nitrate were injected into the lower aquifer. Biogeochemical changes within the benzene plume were monitored for more than one year. Nitrate was microbiologically consumed, but benzene was not biodegraded by sulfate-reducing consortia. However, small carbon isotope fractionation of benzene suggested the presence of in situ benzene biodegradation processes in the plume, probably supported by nitrate. In conclusion, nitrate injection resulted in changing redox conditions and recycling of sulfate in the benzene plume due to microbial oxidation of reduced sulfur species, potentially leading to conditions favorable for in situ benzene biodegradation.

### SULFIDATED NANO ZEROVALENT IRON (S-NZVI) FOR IN SITU TREATMENT OF CHLORINATED SOLVENTS: A FIELD STUDY

Garcia, A.N., H.K. Boparai, A.I.A. Chowdhury, C.V. de Boer, C.M.D. Kocur, E. Passepourt, B.S. Lollar, L.M. Austrins, J. Herrera, and D.M. O'Carroll.

*Water Research* 174:115594(2020)

S-NZVI stabilized with carboxymethyl cellulose (CMC) was synthesized and injected into the subsurface at a site contaminated with cVOCs. Downgradient and upgradient transport of CMC-S-NZVI resulted in a significant decrease in concentrations of aqueous-phase cVOCs. Compound specific isotope analysis, changes in concentrations of intermediates, and increase in ethene concentrations confirmed dechlorination of cVOCs. Dissolution from the DNAPL pool into the aqueous phase at the deepest levels (4.0-4.5 m bgs) was identifiable from the increased cVOCs concentrations during long-term monitoring. However, at the uppermost levels (~1.5 m above the source zone), a contrasting trend was observed, indicating successful dechlorination. No accumulation of lower chlorinated VOCs, particularly vinyl chloride, was observed during the CMC-S-NZVI field treatment. Post-treatment soil cores also revealed significant decreases in cVOC concentrations throughout the targeted treatment zones. Results suggest that sulfidation is a suitable amendment for developing more efficient nZVI-based in situ remediation technologies.

## Research

### CONTAMINATED MARINE SEDIMENT STABILIZATION/SOLIDIFICATION TREATMENT WITH CEMENT/LIME: LEACHING BEHAVIOUR INVESTIGATION.

Todaro, F., S. De Gisi, and M. Notarnicola.

*Environmental Science and Pollution Research International* 27(17):21407-21415(2020)

A laboratory investigation was carried out on contaminated sediments from the Mar Piccolo of Taranto in Southern Italy. The effectiveness of solidification/stabilization (S/S) treatment using Portland cement/lime as binders on heavy metals, PAHs, and PCBs was examined over 28 days. Results indicated that the addition of binders increased the pH of the mixtures, impacting the leachability of different metals. Metal mobility appeared to also be impacted by curing time and the presence of organic contaminants (e.g., organic matter, PAHs, and PCBs). High organic matter and fine-grained particles appeared to negatively affect the effectiveness of metals immobilization.

### COMPARING PFAS TO OTHER GROUNDWATER CONTAMINANTS: IMPLICATIONS FOR REMEDIATION

Newell, C.J., D.T. Adamson, P.R. Kulkarni, B.N. Nzeribe, and H. Stroo.

*Remediation* 30:7-26(2020)

A two-pronged approach was used to evaluate whether groundwater remediation for PFAS needs to be conducted on smaller, similar, or larger scales than established groundwater contaminants. Nine quantitative scale-of-remediation metrics were used to compare PFAS to chlorinated solvents, benzene, 1,4-dioxane, and methyl tert-butyl ether. Several key challenges identified with PFAS remediation were then compared to the challenges and remediation approaches in similar situations (qualitative analogs). Overall, the quantitative metrics and the qualitative analogs suggested that a different combination of remediation approaches may be needed to deal with PFAS sites and may include source control, natural attenuation, in-situ sequestration, containment, and point-of-use treatment. While complete restoration of PFAS sites may be uncommon, it may be possible to prevent excessive exposure of PFAS to human and ecological receptors. <https://onlinelibrary.wiley.com/doi/epdf/10.1002/rem.21645>

### AN EFFECTIVE THERMAL TREATMENT OF TOLUENE-CONTAMINATED SOIL BY UNIFORM HEATING FROM MICROWAVE COUPLED INFRARED RADIATION (MCIR)

Yang, K., M. Fan, X. Han, and Y. Wang.

*Journal of Soils and Sediments* [Published 26 January 2021 prior to print]

This study used a mathematical model to simulate the electric field and temperature induced by microwave and investigated the influence of infrared in the MCIR treatment of soil in a laboratory setting. The model showed that MCIR heating produces uniformity in the thermal field, while laboratory results indicated that infrared could efficiently improve the microwave treatment of soil and achieve a toluene removal efficiency of 92.8% at 500 W microwave coupled with 300 W infrared radiation for 300 s. Furthermore, MCIR did not destroy the structure of toluene by infrared spectrum analysis.

### SUITABILITY OF REMEDIATED PFAS-AFFECTED SOIL IN CEMENT PASTES AND MORTARS

Fehervari, A., W.P. Gates, C. Gallage and F. Collins. | *Sustainability* 12:4300(2020)

This study's purpose was to demonstrate the utility of heat-treated soil as a fine aggregate, with a composition and particle size distribution similar to that of traditional concrete sands, in concrete applications. The study demonstrated that complete fine aggregate replacement could be achieved with minimal loss of compressive strength. A fine aggregate replacement ≥ 60%, a wetting agent was required for maintaining adequate workability. Initial mineralogy, temperature of the heat-treatment, and post-treatment storage (i.e., soil dryness) were found to be key factors. The study also found that up to 15% of cement can be replaced in mortars where minimal strength loss is desired, but up to 45% replacement can be achieved if moderate strengths are acceptable. <https://www.mdpi.com/2071-1050/12/10/4300/pdf>

### SUSPECT AND NONTARGET SCREENING REVEALED CLASS-SPECIFIC TEMPORAL TRENDS (2000-2017) OF POLY- AND PERFLUOROALKYL SUBSTANCES IN ST. LAWRENCE BELUGA WHALES

Barrett, H., X. Du, M. Houde, S. Lair, J. Verreault, and H. Peng.

*Environmental Science & Technology* 55(3):1659-1671(2021)

This study examined temporal trends of legacy and unregulated PFAS presence in beluga whale (*Delphinapterus leucas*) livers from a Canadian estuary. A suite of 54 PFAS from samples collected from 2000-2017 were tentatively identified and grouped into nine structurally distinct classes. Single-hydrogenated perfluoro carboxylic acids (H-PFCAs), single-hydrogenated sulfonamides (H-sulfonamides), as well as other select sulfonamides were detected for the first time in wildlife. The majority of PFASs were found at higher concentrations in newborns and juveniles than in adults, suggesting effective placental and lactational transfer of PFAS. Legacy per- and polyfluoroalkyl acids and perfluorooctane sulfonamide in beluga whale liver were found to significantly decrease in concentration between 2000 and 2017, while unregulated short-chain PFAS alternatives, H-PFCAs, and odd-chain fluorotelomer carboxylic acids were found to increase over time. The implementation of suspect and nontarget screening revealed class-specific temporal trends of PFASs in the beluga whales, suggesting the presence of continuous emissions of unregulated PFASs into the environment.

### ONLINE MICRODIALYSIS-HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY-INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY (MD-HPLC-ICP-MS) AS A NOVEL TOOL FOR SAMPLING HEXAVALENT CHROMIUM IN SOIL SOLUTION

Hamilton, E.M., S.D. Young, E.H. Bailey, O.S. Humphrey, and M.J. Watts.

*Environmental Science & Technology* 55(4):2422-2429(2021)

Microdialysis (MD) was paired with HPLC-ICP-MS for the continuous sampling and simultaneous detection of CrVI in soil solution. High repeatability of measurement (RSD < 2.5%) was obtained for CrVI, with a detection limit of 0.2 µg/L. The online MD-HPLC-ICP-MS setup was applied to the sampling of native CrVI in three soils with differing geochemical properties. The system sampled and analyzed fresh soil solution at 15 min intervals, offering improved temporal resolution and a significant reduction in analysis time over offline MD. The results suggested that simple modifications to the chromatographic conditions could resolve additional analytes, offering a tool for the study of solute fluxes in soil systems.

### POLYCHLORINATED NAPHTHALENES ACROSS THE GREAT LAKES: LAKE TROUT AND WALLEYE CONCENTRATIONS, TRENDS, AND TEQ ASSESSMENT—2004-2018

Pagano, J.J. and A.J. Garner. | *Environmental Science & Technology* 55(4):2411-2421(2021)

Isotope dilution techniques with high-resolution gas chromatography/high-resolution mass spectrometry were used to assess concentrations and toxic equivalence (TEQ) of polychlorinated

naphthalenes (PCNs) in lake trout and walleye. An age-trend model was applied to mitigate the effect of a changing lake trout age structure. Most sampling sites demonstrated significant half-life and percent decreases for lake trout total PCNs and total TEQ over the 2004-2018 study period, the exceptions being Lake Erie lake trout and walleye, which exhibited increasing concentrations. Based on the average number of chlorines per naphthalene, it was determined that the overall lake trout and walleye PCN congener distribution has significantly shifted to a lower-chlorinated composition in the Great Lakes and resulted in a 59.1% reduction of the overall total PCN TEQ burden. A prominent PCN concentration trend breakpoint was observed in Lake Ontario lake trout over the 2012-2016 period, likely associated with hazardous waste cleanups, channel dredging, and spoils disposal in the Detroit River and western-basin of Lake Erie.

#### **EVALUATION FOR THE REMOVAL EFFICIENCY OF VOCs AND HEAVY METALS BY ZEOLITES-BASED MATERIALS IN THE WASTEWATER: A CASE STUDY IN THE TITO SCALO INDUSTRIAL AREA**

Mancinelli, M., A. Arfe, A. Martucci, L. Pasti, T. Chenet, E. Sarti, G. Vergine, and C. Belviso. Processes 8:1519(2020)

The efficiency of zeolite materials for the immobilization of heavy metals and VOCs in wastewater was evaluated using gas chromatography and inductively coupled plasma optical emission spectrometry. Thermal analysis (TG, DTA) and X-ray powder diffraction were then used to verify the presence of contaminants in the structural channels of the adsorbents. ZSM-5 zeolite (MFI topology) demonstrated removal efficiencies >87% for VOCs. Zeolite 13X (FAU topology) was more selective for in situ abatements of heavy metals, with efficiencies up to 100%. After VOC and heavy metal removal, structure refinements of loaded zeolites highlighted variations of both lattice parameters and extraframework content, confirming pollutant immobilization in the framework microporosities. The occurrence of these species was also confirmed by DTA curves showing different phenomena explained based on the nature and number of extraframework species hosted in the zeolite micropores. <https://www.mdpi.com/2227-9717/8/11/1519/pdf>

### **General News**

#### **BACTERIAL-INDUCED MINERALIZATION (BIM) FOR SOIL SOLIDIFICATION AND HEAVY METAL STABILIZATION: A CRITICAL REVIEW**

Han, L., J. Li, Q. Xue, Z. Chen, Y. Zhou, and C.S. Poon. Science of The Total Environment 746:140967(2020)

In this review, bacterial-induced mineralization (BIM) is proposed as an eco-friendly and efficient solidification and stabilization (S/S) method. Life activities of bacteria produce minerals to cement the soil particles and fix heavy metals. This review summarizes the basic theories of BIM technology, evaluates the remediation effects and long-term stability in terms of soil solidification and heavy metal stabilization, and reviews factors in BIM-S/S application. Emphasis is put on comparing the BIM-S/S effect with that of cement-based-S/S technology. The review identifies current limitations and deficiencies and the directions for future research to advance the BIM-S/S technology.

#### **PFAS, TOTAL ORGANIC PRECURSORS (TOPS) AND TOTAL ORGANIC FLUORINE (TOF): "WHAT'S THE DIFFERENCE AND WHEN TO USE ONE OVER THE OTHER?"**

Obal, T. | Smart Remediation, 4 February, virtual, 17 slides, 2021

This presentation describes several analytical techniques for measuring TOPS and TOF as a proxy for PFAS contamination. It highlights their advantages and limitations and describes specific situations where it is advantageous to use one over the other or to have one complement the other.

<https://2ziaphmm3zh1x23mj335vjx-wpengine.netdna-ssl.com/wp-content/uploads/2021/01/SMART-Remediation-Virtual-Session-2-Feb-11-2021-Taras-Terry-Obal.pdf>

#### **MAKING DECISIONS AND MAKING A DIFFERENCE IN SUPERFUND: ADMINISTRATOR'S EMPHASIS LIST 2017-2021**

EPA Superfund Task Force, EPA 540-B21-001 35 pp, 2021

This document summarizes sites included on the Administrator's Emphasis List since its inception. It identifies each site's milestones and the progress that has been made to date. The Administrator's Emphasis List has been recognized by communities, responsible parties, and the Regions as a very effective tool in facilitating decisions and other actions at sites to accelerate cleanups that protect human health and the environment and provide opportunities to be returned to communities for their next use.

<https://www.epa.gov/sites/production/files/2021-01/documents/2020-ael-summary-report-compliant.pdf>

#### **REMEDIATION OF POLY- AND PERFLUOROALKYL SUBSTANCES (PFAS) CONTAMINATED SOILS — TO MOBILIZE OR TO IMMOBILIZE OR TO DEGRADE?**

Bolan, N., B. Sarkar, Y. Yan, Q. Li, H. Wijesekara, K. Kannan, D.C.W. Tsang, M. Schauerte, J. Bosch, H. Noll, Y.S. Ok, K. Scheckel, J. Kumpiene, K. Gobindal, M. Kah, J. Sperry, M.B. Kirkham, H. Wang, Y.F. Tsang, D. Hou, and J. Rinklebe. Journal of Hazardous Materials 401:123892(2021)

This review presents remediation of PFAS contaminated soils through manipulation of their bioavailability and destruction using mobilizing and immobilizing agents. Mobilizing amendments (e.g., surfactants) can be applied to facilitate the removal of PFAS through soil washing and phytoremediation, and complete destruction through thermal and chemical redox reactions. Immobilizing amendments (e.g., activated carbon) are likely to reduce the transfer of PFAS to food chain through plant and biota uptake and leaching to potable water sources.

#### **REVIEW OF AMENDMENT DELIVERY AND DISTRIBUTION METHODS, AND RELEVANCE TO POTENTIAL IN SITU SOURCE AREA TREATMENT AT THE HANFORD SITE**

Muller, K.A., C.D. Johnson, C.E. Bagwell, and V.L. Freedman., Pacific Northwest National Laboratory prepared for DOE, 107 pp, 2019

This document summarizes amendment types, delivery techniques, subsurface access methods, and the applicability of delivery methods and amendments for specific subsurface target zones, including those used at the Hanford Site Central Plateau. It is intended to be used when considering remediation technologies and the associated amendments. An overview of amendment types and access/distribution methods used in subsurface remediation is provided, along with discussion of the maturity level, advantages, and limitations that relate to the potential effectiveness of each approach in the context of site-specific factors. Many Hanford site-specific factors influence the suitability and appropriateness of amendment delivery strategies. Each approach was assessed for applicability to the unsaturated high permeability, unsaturated low permeability, perched water, saturated high permeability, and saturated low permeability zones. This compilation and discussion related to amendment delivery mechanisms provides a useful resource for evaluating remedial alternatives for source area contamination at the site.

<https://www.oost.gov/servlets/purl/1684619>

#### **NEW AND FUTURE DEVELOPMENTS IN MICROBIAL BIOTECHNOLOGY AND BIOENGINEERING: RECENT ADVANCES IN APPLICATION OF FUNGI AND FUNGAL METABOLITES: ENVIRONMENTAL AND INDUSTRIAL ASPECTS**

Singh, J. and Praveen Gehlot (eds). Elsevier, ISBN 978-0-12-821007-9, 260 pp, 2020

In 19 chapters, this book provides a comprehensive overview of recent development and applied aspects of fungi and its metabolites in environmental and industrial settings. This book offers a systems approach and provides a means to share the latest developments and advances about the exploitation of fungal products, including their wide uses in the field of environment and industry. View the table of contents and abstracts at

<https://www.sciencedirect.com/book/9780128210079/new-and-future-developments-in-microbial-biotechnology-and-bioengineering?via=ihub=#book-description>

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