

# Technology Innovation News Survey

Entries for November 1-15, 2017

## Market/Commercialization Information

### CERCLA ENVIRONMENTAL RESPONSE

USDA, Forest Service, R-5 Northern CA Acquisition Service Area, Redding, CA.  
Federal Business Opportunities, FBO-5866, Solicitation 1291S8-18-R-0001, 2017

This acquisition will be 100% set-aside for small business under NAICS code 562910, size standard of \$20.5M or 750 employees. The U.S. Forest Service, Region 5, intends to issue a solicitation toward the end of January 2018 for a multi-award CERCLA Environmental Response IDIQ contract. The intent of this multi-award contract is to secure the professional services of one or more contractors to provide technical services for site response activities, such as conducting various evaluations, studies, and reports as specified in the National Contingency Plan, RCRA, or other federal or state hazardous waste cleanup regulations. The contractor may be requested to complete the following studies: preliminary assessment (PA), site inspection (SI), combined PA/SI, risk assessment, an engineering evaluation/cost analysis, a remedial investigation/feasibility study, or other work required for CERCLA response actions, including enforcement support. The contractor may also be requested to implement the CERCLA site remedy. A majority of the projects in all of the activity areas are likely to involve abandoned or inactive mine sites, dumps, or landfills located throughout Pacific Southwest Region 5, which includes 18 National Forests. The contract will be firm-fixed-price for a 5-year period from the date of award, which is anticipated in or around May 2018. <https://www.fbo.gov/notices/35147bb460bf80513dfe2bfb475a5001>

### ENVIRONMENTAL SERVICES

Department of the Army, U.S. Army Corps of Engineers, USACE District St. Louis, MO.  
Federal Business Opportunities, FBO-5854, Solicitation w912p917r0055, 2017

This acquisition is a woman-owned small business set-aside. The contractor must have available the equipment, staff, and overall capability to accomplish environmental services in support of not only the St. Louis District but throughout the Mississippi Valley Division and other CONUS areas where noted. The required services include but are not limited to field sampling; analysis of lab data; in situ field analysis of samples; emergency response support; testing of dredged materials to determine contaminant concentrations; environmental studies; HTRW-related data review, evaluation, and report preparation; literature and data searches; HTRW and MMRP support for FUDS in accordance with CERCLA; remedial action/feasibility studies; remedial design/remedial actions; environmental compliance documentation; industrial hygiene surveys; environmental site assessments; and other services as delineated in the SOW. Offers must be received no later than 2:00 PM CT on Thursday, January 4, 2018.

<https://www.fbo.gov/notices/14ac86556d0e3a6cda7bc4d144ac1cd7>

### TECHNICAL ASSISTANCE FOR THE LAKE ROOSEVELT NATIONAL RECREATION AREA (LARO)

Department of the Interior, National Park Service, Denver, CO.  
Federal Business Opportunities, FBO-5854, Solicitation 140P8318Q0009, 2017

The National Park Service intends to advertise for an advisory and assistance single-award IDIQ Task Order-type contract for the LARO National Recreation Area (NRA), with a total capacity of \$3.5M. The geographic area to be served is the Upper Columbia River Basin within the Lake Roosevelt NRA, located in the northeast portion of the state of Washington and stretching 133 miles up the Columbia River from Grand Coulee Dam to Onion Creek. This acquisition will be solicited and awarded on a competitive basis set aside for small business under NAICS code 541620 (Environmental Consulting Services), size standard of \$15M. The planned duration of the contract consists of a base and four option years. Each task order will be a firm-fixed-price order to provide technical assistance with issues arising from NPS involvement in the Upper Columbia River/Lake Roosevelt remedial investigation/feasibility study, the Upper Columbia River/Lake Roosevelt natural resource damage assessment, and restoration efforts and other resource management-related projects at LARO. Release of the solicitation is anticipated on or after January 1, 2018.

<https://www.fbo.gov/spg/DOI/NPS/APC-IS/140P8318Q0009/listing.html>

### NWD REGIONAL HAZARDOUS MATERIAL ABATEMENT MATOC

U.S. Army Corps of Engineers, USACE District, Walla Walla, WA.  
Federal Business Opportunities, FBO-5866, Solicitation W912EF-18R0015, 2017

This acquisition is a total small business set-aside under NAICS code 238910. The Northwestern Division of the U.S. Army Corps of Engineers has a requirement for hazardous material abatement in connection with removal and disposal of asbestos, lead-based paint, and other solid or hazardous wastes for all federal facilities within the boundaries of the Portland, Seattle, and Walla Walla Districts. The work covered in this contract includes but is not limited to survey, testing, containment, sustainment, modernization, removal, treatment, transportation, and disposal of existing hazardous materials and non-regulated toxic substances on federal facilities within the NWD. The majority of the work will occur on the hydroelectric facilities machinery/equipment throughout the Pacific Northwest region. The solicitation will be for an IDIQ contract with a base period and a 2-year option. The acquisition method for this procurement will be RFP best-value trade-off to result in a firm-fixed-price contract. [NOTE: This presolicitation notice does not identify the anticipated proposal release date.] <https://www.fbo.gov/spg/USA/COE/DACA68/W912EF-18R0015/listing.html>

## Cleanup News

### TAR LAKE SUPERFUND SITE, MANCELONA, MI

Fiscal Year 2016 Federal Superfund Legislative Report, Michigan Department of Environmental Quality (MDEQ), p 9-19, 2017

The 200-acre site is located in Mancelona Township, Michigan. An iron works operating on the site from 1882 to 1945 discharged tar-like waste residue containing phenols, heavy metals, and VOCs to a low-lying area of the site called Tar Lake. EPA conducted a fund-lead removal action in 1998-1999 and removed 47,043 tons of tar and tar debris from OU-1. MDEQ installed an on-site in situ biosparge groundwater treatment system downgradient of the tar removal area in 1998. The biosparge system injects air into the aquifer to increase the biodegradation of groundwater contaminants (wood tar organics, PAHs, and phenolics) and prevent downgradient migration. Inorganic contamination (soluble iron and manganese) has not been addressed but will be evaluated once organics cleanup is complete. The agencies plan to expand the biosparge groundwater treatment system 225 ft to the northwest and 550 ft upgradient into the low-lying tar lake area. [http://www.michigan.gov/documents/deq/deq-rrd-SFS-2016SuperfundLegislativeReport\\_559627\\_7.pdf](http://www.michigan.gov/documents/deq/deq-rrd-SFS-2016SuperfundLegislativeReport_559627_7.pdf)

### AIRCRAFT COMPONENTS SUPERFUND SITE, BENTON HARBOR, MI

Fiscal Year 2016 Federal Superfund Legislative Report, Michigan Department of Environmental Quality (MDEQ), p 20-28, 2017

Aircraft Components (a.k.a. D & L Sales, Benton Harbor Warehouse) operated a mail order catalog business selling army surplus supplies and equipment. Radioactive gauges purchased from the Air Force were stored in a warehouse on the 17-acre site. Many of the gauges were cracked and broken, which allowed the paint to escape as particulate matter. Gauges were also found partially buried outside the warehouse. EPA conducted a removal action in 1999 that dealt with the bulk of the radioactive materials, and OU-1 demolition and soil excavation activities were completed in 2004. Site investigations showed significant levels of VC, DCE, TCE, PCE, benzo[a]pyrene, and Hg and numerous other metals in the site's soil, sediments, groundwater, and surface water. OU-2 groundwater work began in June 2004 with the injection of hydrogen releasing compound (HRC), completed by mid-August, with follow-up injections into the source area completed in November 2007 and March 2008. In May 2007, the 530-acre Harbor Shores redevelopment project was initiated. The developer is responsible for any additional HRC injections that might be required. EPA performed an in situ chemical oxidation pilot test using sodium persulfate to address the site's remaining groundwater contamination in spring 2013, followed by full-scale implementation in March 2014.

[http://www.michigan.gov/documents/deq/deq-rrd-SFS-2016SuperfundLegislativeReport\\_559627\\_7.pdf](http://www.michigan.gov/documents/deq/deq-rrd-SFS-2016SuperfundLegislativeReport_559627_7.pdf)

See also the December 2015 Data Summary Report and 2014 Remedial Action Evaluation at <https://semspub.epa.gov/src/document/05/929826>.

#### **SANDIA NATIONAL LABORATORIES, NEW MEXICO, ENVIRONMENTAL RESTORATION OPERATIONS: CONSOLIDATED QUARTERLY REPORT, APRIL - JUNE 2017**

SAND2017-11265R, 68 pp, 2017

Ongoing corrective action being implemented in 2017 at Sandia National Laboratories, New Mexico, includes the Technical Area-V Groundwater Area of Concern, where TCE and nitrate have been identified as groundwater contaminants of concern based on detections above EPA MCLs in samples collected from monitoring wells. The EPA MCLs and State of New Mexico drinking water standards for TCE and nitrate are 5 µg/L and 10 mg/L (as nitrogen), respectively. A phased treatability study/interim measure of in situ bioremediation (ISB) is underway to evaluate ISB effectiveness for treating the groundwater. Up to three injection wells will be installed in the vicinity of the groundwater monitoring wells showing the highest contaminant concentrations. The substrate solution containing nutrients for biostimulation will be prepared in aboveground tanks, and nutrients and biodegradation bacteria will be introduced to groundwater via gravity injection. <https://www.osti.gov/scitech/servlets/purl/1404825>

#### **CHANGES IN CLEANUP STRATEGIES AND LONG-TERM MONITORING COSTS FOR DOE FUSRAP SITES**

Castillo, D., C. Carpenter, R. Roberts, and C. Young.  
Waste Management 2017 Conference, 5-9 March 2017, Phoenix, Arizona. Paper 17241, 8 pp, 2017

In 1997, the U.S. Army Corps of Engineers (USACE) was mandated by Congress to undertake the remediation of the Formerly Used Sites Remedial Action Program (FUSRAP), while DOE retained responsibility for determining whether a site was eligible for the program. DOE's Office of Legacy Management (LM) is responsible for long-term stewardship of the sites after they are remediated by USACE. LM currently provides long-term stewardship for 30 completed FUSRAP sites while USACE is actively remediating 23 sites. LM is preparing for the transfer of 11 new FUSRAP sites within the next 10 years from USACE, many of which will have substantially greater long-term surveillance and maintenance requirements than the currently completed sites. LM is analyzing estimates for the level of effort required to monitor the new sites to make more customized and accurate predictions of future life cycle costs and environmental liabilities of these sites. <https://www.osti.gov/scitech/servlets/purl/1358447>

#### **LONG-TERM STEWARDSHIP AT A FORMER URANIUM MILL TAILINGS SITE IN RIVERTON, WYOMING**

Dam, W., A. Gil, R.H. Johnson, S. Campbell, J.R. Bargar, and M. Picel.  
Waste Management 2017, Presentation 17090, 21 slides, 2017

A former uranium mill that operated from 1958 to 1963 near Riverton, Wyoming, is within the boundary of the Wind River Indian Reservation. Tailings and contaminated material associated with mill operations were removed and transported to an offsite disposal cell in 1989. Seepage from an unlined tailings impoundment and an unlined evaporation pond contaminated the shallow groundwater, resulting in a downgradient groundwater plume that discharges to the Little Wind River. A natural flushing compliance strategy was implemented in 1998 that allows contaminants of concern to flush naturally from the groundwater, provided the contaminants flush below U.S. EPA MCLs within 100 years. The Riverton site provides a case study where contaminant remobilization due to river flooding prompted a reevaluation of the conceptual site model to verify if the current compliance strategy would remain protective of human health and the environment. Concentrations of groundwater contaminants, which include sulfate, molybdenum, and uranium, were transiently elevated following flooding of the Little Wind River in 2010 and 2016. These flood events provided the impetus to investigate other aspects of the hydrologic system, including the unsaturated zone, naturally reduced (sulfidic) zones, and evaporite deposits. New site conceptual models, field and laboratory studies, and numerical models are being developed to explain how biogeochemical sediment-water interactions contribute to plume persistence and flood-related increases in groundwater concentrations.

<https://www.osti.gov/scitech/biblio/1345366-long-term-stewardship-former-uranium-mill-tailings-site-riverton-wyoming-wm2017>

### **Demonstrations / Feasibility Studies**

#### **PROVIDING ADDITIONAL SUPPORT FOR MNA BY INCLUDING QUANTITATIVE LINES OF EVIDENCE FOR ABIOTIC DEGRADATION AND CO-METABOLIC OXIDATION OF CHLORINATED ETHYLENES**

Wiedemeier, T.H., J.T. Wilson, D.L. Freedman, and B. Lee.  
ESTCP Project ER-201584, 632 pp, 2017

The five sites selected for the ER-201584 demonstration project were Hill AFB OU-10, Hopewell Precision Site, Tooele Army Depot, the former Twin Cites Army Ammunition Plant, and the former Plattsburgh AFB. The objectives were to (1) provide a method to readily and inexpensively acquire the magnetic susceptibility data required to evaluate the abiotic degradation of TCE by magnetite in aquifer materials using existing non-metallic groundwater monitoring wells, and (2) provide a method to readily and inexpensively acquire the data required to evaluate and quantify the rate constant for aerobic biological co-oxidation of TCE. This report shows that an inexpensive downhole sonde (probe) can be used in existing 2- and 4-inch PVC groundwater monitoring wells to quantify magnetic susceptibility of aquifer material. The cost to determine volume magnetic susceptibility in one well using a down-hole sonde was ~\$2,000. Additional per-well costs were ~\$476 for C-14 assay of the rate constant of TCE cooxidation; ~\$1,900 for EAP assay; and ~\$835 for qPCR analyses. <https://www.serdp-estcp.org/content/download/46230/430569/file/ER-201584%20Final%20Report.pdf> See also the **ESTCP Cost and Performance Report at** <https://www.serdp-estcp.org/content/download/46339/431460/file/ER-201584%20Cost%20&%20Performance%20Report.pdf>.

#### **COST-EFFECTIVE AND HIGH-RESOLUTION SUBSURFACE CHARACTERIZATION USING HYDRAULIC TOMOGRAPHY**

Mok, C.M., W.A. Illman, and T.-C.J. Yeh.  
ESTCP Project ER-201212, 117 pp, 2017

Hydraulic conductivity (K) and specific storage (Ss) are the major parameters governing the fate and transport of contaminants in the subsurface. High-K zones and fractures are fast-flow conduits where transport of dissolved contaminants potentially poses significant threats to downgradient receptors. Low-K zones are potential repositories of contaminant mass that slowly release contaminants and contribute to long-term risks and liability. The overall objective of this project was to provide DoD and its remediation contractors with hydraulic tomography (HT) technology for delineating the spatial distribution of the K and Ss parameters in high resolution. Specific technical objectives were to (1) demonstrate that HT is superior to conventional methods for estimating the spatial distribution of hydrogeologic properties; (2) illustrate that an HT survey can be readily conducted using existing networks of groundwater extraction/injection and observation wells; and (3) develop guidance for HT field implementation and compare costs associated with HT and conventional methods. Results from demonstrations at the University of Waterloo North Campus Research Site and Air Force Plant No. 44 confirmed that HT was more accurate than conventional site characterization techniques.

<https://www.serdp-estcp.org/content/download/45925/427905/file/ER-201212%20Final%20Report.pdf>

## **ELECTROKINETIC TREATMENT OF POLLUTED SOIL AT PILOT LEVEL COUPLED TO AN ADVANCED OXIDATION PROCESS OF ITS WASTEWATER**

Ochoa, B., L. Ramos, A. Garibay, M. Perez-Corona, M.C. Cuevas, J. Cardenas, M. Teutli, and E. Bustos. *Physics and Chemistry of the Earth* 91:68-76(2016)

A pilot-level electroremediation test was implemented using a circular arrangement of electrodes with a Ti cathode at the middle of the cell surrounded by six IrO<sub>2</sub>-Ta<sub>2</sub>O<sub>5</sub> | Ti anodes. The presence of NaOH electrolyte helped to develop the electromigration and electroosmosis of gasoline molecules (at 1126 mg/kg) surrounded by Na<sup>+</sup> ions. The hydrocarbons were directed toward the cathode and subsequently removed in an aqueous Na<sup>+</sup>/hydrocarbon solution, and the -OH migrated to the anode. The physicochemical characteristics of the soil close to either the cathode or anode and at the half-cell were evaluated during the three weeks of electrokinetic treatment. During that time, >80% of hydrocarbons were removed from the gasoline-polluted soil, collected in a central wastewater compartment, and treated with a Fenton-type advanced oxidation process that achieved >70% mineralization of the hydrocarbons to CO<sub>2</sub> and H<sub>2</sub>O within 1.5 h. Low toxicity was verified using the Deltatox® kit test. In the pilot application, the residual water complied with the permissible limits of COD, pH, and electrical conductivity for being discharged into water bodies according to Mexican regulation.

## **ELECTROCHEMICAL REMEDIATION OF CONTAMINATED GROUNDWATER: PILOT SCALE STUDY**

Gregor, S., N. Fallahpour, L. Rajic, and A. Alshwabkeh.

*Karst Groundwater Contamination and Public Health*. Advances in Karst Science, White, W., J. Herman, E. Herman, and M. Rutigliano (eds). Springer, New York. 117-120(2018)

Electrochemical technologies for groundwater treatment use a low-level direct current through electrodes in wells to enable manipulation of groundwater chemistry. This approach has several advantages: 1) It is sustainable and can be driven by a renewable energy source, such as solar power; 2) it does not require the addition of solutions or chemicals to groundwater; and 3) the rates of redox reactions can be controlled by adjusting electric current intensity. Two transformation mechanisms were evaluated within this approach depending on electrode materials used: electrochemical reduction of contaminants using iron anodes and foam cathodes, and electrochemical oxidation of contaminants by generation of reactive oxygen species using inert electrodes. The first step in the implementation of electrochemical technologies was the development of an electrolytic reactor within the aquifer. The effects of the concentration of added ferrous ions, salts, and operational conditions such as flow rates and current density were considered to optimize remedial system conditions.

**Poster:** <https://web.northeastern.edu/routes/wp-content/uploads/2017/04/SGregor.pdf>

## **Research**

### **EVIDENCE OF A SEWER VAPOR TRANSPORT PATHWAY AT THE USEPA VAPOR INTRUSION RESEARCH DUPLEX**

McHugh, T., L. Beckley, T. Sullivan, C. Lutes, R. Truesdale, R. Uppencamp, B. Cosky, J.H. Zimmerman, and B. Schumacher. *Science of the Total Environment* 598:772-779(2017)

Although previous site remediation efforts have highlighted the importance of sewer lines in transporting VOCs, sewer lines are not routinely sampled during most vapor intrusion investigations, and their role as pathways for vapor intrusion is poorly understood. Results from the tracer study at the USEPA vapor intrusion research duplex (Indianapolis, Ind.) demonstrated the migration of gas from the sewer main line into the duplex. The migration pathway appears to be complex and may include leakage from the sewer lateral at a location below the building foundation. These results combined with results from the prior multi-year study suggest sewer lines should be routinely evaluated as part of vapor intrusion investigations.

**Paper:** <https://www.bnl.gov/envsci/pubs/pdf/2017/BNL-113837-2017-JA.pdf>

**Webinar recording, slides and audio, Part 1:**

<https://iavi.rti.org/WorkshopsAndConferences.cfm?PageID=documentDetails&AttachID=1071>

**Part 2:** <https://iavi.rti.org/WorkshopsAndConferences.cfm?PageID=documentDetails&AttachID=1072>

### **IN SITU TREATMENT TRAIN FOR REMEDIATION OF PERFLUOROALKYL CONTAMINATED GROUNDWATER: IN SITU CHEMICAL OXIDATION OF SORBED CONTAMINANTS (ISCO-SC)**

Crimi, M., T. Holsen, C. Bellona, C. Divine, and E. Dickenson. *SERDP Project ER-2423*, 148 pp, 2017

The HRX Well™ approach involves installation of a large-diameter horizontal well within a contaminant plume, oriented in the general direction of groundwater flow and filled with granular reactive media. The technology is currently in the process of demonstration and field validation under ESTCP project ER-201631. Project ER-2423's objective was to develop a predictable and low-cost in situ reactive media treatment train in a horizontal well (technically named in situ chemical oxidation of sorbed contaminants, or ISCO-SC) to remediate PFAS-contaminated groundwater. In the ISCO-SC treatment train, granular activated carbon (GAC) was used to sorb and concentrate PFAS- and aqueous film-forming foam (AFFF)-derived co-contaminants in situ, followed by contaminant destruction and GAC regeneration in situ using activated persulfide oxidation. Persulfate dose efficiency, PFAS oxidation byproducts and intermediates, the possibility for in situ regeneration of PFAS sorbed onto GAC, and GAC reusability with treatment were explored broadly in addition to characterization of the biotransformation pathways for persistent PFOS using Meta-PC degradation simulation software.

<https://www.serdp-estcp.org/content/download/45927/427925/file/ER-2423%20Final%20Report.pdf>

### **REVIEW AND SYNTHESIS OF EVIDENCE REGARDING ENVIRONMENTAL RISKS POSED BY MUNITIONS CONSTITUENTS (MC) IN AQUATIC SYSTEMS**

Lotufo, G.R., M.A. Chappell, C.L. Price, M.L. Ballentine, A.A. Fuentes, T.S. Bridges, et al. *SERDP Project ER-2341, ERDC/EL TR-17-17*, 254 pp, 2017

Underwater military munitions (UWMM) typically contain munitions constituents (MC) such as TNT and RDX. If UWMM breach or become corroded, the fill material can leak or dissolve into the surrounding environment. Detailed and reliable information about MC in water, sediment, and biota is available for only a few sites owing to the high cost and complexity associated with sampling MC at UWMM sites. Examination of available data indicates that concentrations of MC in water and sediment fell largely below detection or were relatively low (e.g., parts per billion), with higher concentrations being highly localized and typically near a point source. These findings are in accordance with predictive modeling and with fate studies. Available toxicity data derived for a variety of freshwater and marine species were compiled and used to derive interim water quality criteria and protective values derived from species sensitivity distributions. Although toxicity varied widely across a diversity of MC and species, MC contamination in sediment and the water column appears to present low risk to resident biota for most aquatic sites.

<https://www.serdp-estcp.org/content/download/46229/430559/file/ER-2341%20Final%20Report.pdf>

### **HEADSPACE GAS CHROMATOGRAPHIC DETERMINATION OF 1,4-DIOXANE WITH ADSORPTION PRECONCENTRATION ON SILICA MODIFIED WITH λ-CARRAGEENAN**

Fedorchuk, O.I., N.G. Kobylinska, and V.N. Zaitsev. *Journal of Analytical Chemistry* 72(3):295-302(2017)

Organosilica materials containing lambda-carrageenan on their surface were synthesized, and conditions for polysaccharide immobilization—phase contact time, pH, and solutions concentration—was optimized. The chemisorption of the polysaccharide passes

through ion exchange multipoint immobilization, which provides a high hydrolytic stability of the prepared organosilica. The material is completely stable up to 200°C and reversibly desorbs water at 120°C; it adsorbs dioxane well from the gas phase and desorbs it under heating to 70°C. This ensures the use of the prepared carrageenan-containing material as an adsorbent for a solid-phase cartridge designed for the adsorption preconcentration of dioxane in its headspace GC determination in samples of nonionic surfactants. The developed procedure ensures the determination of dioxane by GC with a flame ionization detector in the concentration range 0.012-3.750 mg/L with a limit of detection of 0.0014 mg/L. Preconcentration lowers the limit of detection in dioxane determination by 50 times.

#### **POTENTIAL FOR COMETABOLIC BIODEGRADATION OF 1,4-DIOXANE IN AQUIFERS WITH METHANE OR ETHANE AS PRIMARY SUBSTRATES**

Hatzinger, P.B., R. Banerjee, R. Rezes, S.H. Streger, K. McClay, and C.E. Schaefer.  
Biodegradation 28(5-6):453-468(2017)

During an aquifer microcosm study, ethane was observed to stimulate aerobic dioxane biodegradation. An ethane-oxidizing enrichment culture from these samples and a pure culture capable of growing on ethane (*Mycobacterium sphagni* ENV482), which was isolated from a different aquifer, also biodegraded dioxane. Unlike ethane, methane was not seen to stimulate dioxane biodegradation in aquifer microcosms or in methane-oxidizing mixed cultures enriched from two different aquifers, nor did three different pure cultures of mesophilic methanotrophs, although each rapidly oxidized TCE. Subsequent studies showed that dioxane is not a substrate for purified soluble methane monooxygenase enzyme from *Methylosinus trichosporium* OB3b, at least not at the concentrations evaluated, which significantly exceeded those typically observed at contaminated sites. Thus, the data indicate that ethane, a common daughter product of the biotic or abiotic reductive dechlorination of chlorinated ethanes and ethenes, might serve as a substrate to enhance dioxane degradation in aquifers, particularly in zones where these products mix with aerobic groundwater. It might also be possible to stimulate dioxane biodegradation in an aerobic aquifer through addition of ethane gas. See additional information on this study from SERDP Project ER-2306 at <http://www.dtic.mil/dtic/tr/fulltext/u2/1022557.pdf>.

#### **INFLUENCE OF GROUNDWATER CONSTITUENTS ON 1,4-DIOXANE DEGRADATION BY A BINARY OXIDANT SYSTEM**

Yan, N., F. Liu, Y. Chen, and M.L. Brusseau.  
Water, Air, & Soil Pollution 227(12):436(2016)

The influence of groundwater on dioxane degradation by siderite-activated hydrogen peroxide coupled with persulfate was investigated in a series of batch experiments. Dioxane degradation was considerably slower in groundwater compared to tests conducted with ultrapure water. Additional tests were conducted to examine potential inhibitory effects of selected ions in isolation. The inhibition effect of anions on dioxane degradation, from strongest inhibition to weakest, was bicarbonate > sulfate > chloride. The inhibiting effects of cations on dioxane degradation, from strongest inhibition to weakest, was calcium > potassium > magnesium. Bicarbonate and calcium ions, the most abundant ions in the tested groundwater, produced the greatest decrease in dioxane degradation rate compared to the other constituents. Results of experiments conducted to evaluate their impact over a range of concentrations showed that dioxane degradation declined asymptotically with the increase in inhibitor concentrations. This study revealed the potential inhibitory effect of groundwater constituents during the application of activated binary H<sub>2</sub>O<sub>2</sub>-persulfate for in situ treatment of organic contaminants in groundwater. The effect is attributed to radical scavenging, and its impact should be considered during the evaluation of total oxidant demand prior to application. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5603204/>

#### **1,4-DIOXANE POLLUTION AT CONTAMINATED GROUNDWATER SITES IN WESTERN GERMANY AND ITS DISTRIBUTION WITHIN A TCE PLUME**

Karges, U., J. Becker, and W. Puettmann.  
Science of the Total Environment 619-620:712-720(2018)

Scientists investigated selected and representative groundwater sites in Germany suspected of 1,4-dioxane occurrence. Five of the sites are well known for their volatile chlorinated hydrocarbon contamination, two sites have representative landfill leachate characteristics, and one site is negatively affected by a detergent manufacturing plant. The presence of dioxane was observed at each of these sites; maximum concentration values ranged from 0.15 to 152 µg/L. An aquifer containing a TCE plume with dioxane as a co-contaminant was investigated in more detail. A perfect match was found between the concentrations of dioxane and TCE in the vertical and horizontal distribution profiles. Results show the importance of investigating groundwater contamination by dioxane at sites with known TCA and TCE contaminations, in landfill leachates, and at sites of detergent production.

### **General News**

#### **GROUNDWATER AND PFAS: STATE OF KNOWLEDGE AND PRACTICE**

National Ground Water Association (NGWA) Press, Westerville, OH. ISBN: 1-56034-037-1, 114 pp, 2017

Beginning in October 2016, 37 scientists and engineers voluntarily collaborated through the National Ground Water Association to develop information on per- and polyfluoroalkyl substances (PFASs) for the broader groundwater community. Using a consensus-driven process that included a public comment period, their efforts were completed toward the end of 2017. NGWA published this PFAS document to assist members and other groundwater professionals who may be tasked with investigating the transport pathways and extent of PFASs in groundwater and surface water, assessing potential risks to receptors, or designing and constructing engineering controls to manage subsurface PFAS contamination. The main purpose of this document is to summarize the current state of knowledge and practice regarding PFAS fate, transport, remediation, and treatment, recognizing that knowledge in this field continues to advance. This document also summarizes current technologies, methods, and field procedures being used to characterize sites and test remediation and treatment technologies. Temporarily available at <http://www.ngwa.org/Professional-Resources/Pages/Groundwater-and-PFAS.aspx>.

#### **CONTAMINANT FLUX REDUCTION BARRIERS FOR MANAGING DIFFICULT-TO-TREAT SOURCE ZONES IN UNCONSOLIDATED MEDIA: TECHNICAL GUIDANCE MANUAL**

Newell, C., E.A. Higgins, P.R. Kulkarni, and B.A. Strasters.  
ESTCP Project ER-201328, 51 pp, 2017

The overall objective of this project was to evaluate if inexpensive flow reduction agents delivered via permeation grouting technology could help manage difficult-to-treat chlorinated solvent source zones. The approach aims to provide two benefits for improving groundwater quality at chlorinated VOC sites by (1) physically reducing the mass flux of contaminants leaving the source zone by using permeation grouting, thereby reducing risk and making the downgradient plume more amenable to management by natural attenuation processes; and (2) increasing the natural depletion rate within the source by diverting competing electron acceptors around it to create an enhanced reductive dechlorination zone. This report describes the results of a small-scale demonstration that achieved an average 64% reduction in flow through three small barriers, which was lower than the 90% reduction in flow objective, likely owing to the low permeability of the silty sands in the test area. Applications of one acre in area or more can be significantly less costly than conventional in situ remediation technologies (\$996K/acre and \$21/yd<sup>3</sup> for a 1-acre site). Based on lessons learned during the small-scale demonstration, the process is moderately complex to implement in the field but with no major problems.

**Manual:** <https://www.serdp-estcp.org/content/download/46231/430579/file/ER-201328%20Technical%20Guidance%20Manual.pdf>

**Final report:** <https://www.serdp-estcp.org/content/download/45694/425998/file/ER-201328%20Final%20Report.pdf>

**Cost & Performance Report:** <https://www.serdp-estcp.org/content/download/45695/426008/file/ER-201328%20Cost%20&%20Performance%20Report.pdf>

## **BIOAVAILABILITY OF CONTAMINANTS IN SOIL: CONSIDERATIONS FOR HUMAN HEALTH RISK ASSESSMENT**

Interstate Technology and Regulatory Council (ITRC), 2017

This web-based document describes the general concepts of the bioavailability of contaminants in soil, reviews the state of the science, and discusses how to incorporate bioavailability into human health risk assessment. The guide addresses lead, arsenic, and PAHs for the incidental ingestion of soil. <http://bcs-1.itrcweb.org/>

## **NEWTECH CONGRESS 2016: 2ND WORLD CONGRESS ON NEW TECHNOLOGIES, 18-19 AUGUST, BUDAPEST, HUNGARY**

The 2016 NewTech Congress provided opportunities to the attending scientists, researchers, industrial engineers, and university students to present their work and develop new collaborations and partnerships. Three conferences were combined for NewTech 2016: the 7th International Conference on Nanotechnology: Fundamentals and Applications (ICNFA'16); the 6th International Conference on Environmental Pollution and Remediation (ICEPR'16); and the 2nd International Conference on Bioengineering and Biotechnology (ICBB'16). While each conference had an individual and separate theme, the three conferences shared considerable overlap, which prompted the meeting's organization. The goal was to bring together experts in each of the specialized fields and at the same time allow for cross-pollination and sharing of ideas from other closely related areas of research. The extended abstracts are available at [http://avestia.com/NewTech2016\\_Proceedings/files/list\\_of\\_papers.html](http://avestia.com/NewTech2016_Proceedings/files/list_of_papers.html).

## **ABSTRACTS OF ICEENN 2016: 11th INTERNATIONAL CONFERENCE ON THE ENVIRONMENTAL EFFECTS OF NANOPARTICLES AND NANOMATERIALS, COLORADO SCHOOL OF MINES, GOLDEN, CO, 14-18 AUGUST 2016**

The 11th ICEENN brought together researchers, regulators, and industry to discuss recent advances in understanding the nature of nanomaterials and key issues relating to maintaining the economic and social benefits of nanotechnology. Topic coverage included advances in nanomaterial analysis methods; surface chemistry of nanomaterials in complex matrices; nanomaterial release from consumer products and environmental fate; in vivo and in vitro toxicology of nanomaterials; applications of nanomaterials in environment and health; environmental issues of production-scale nanotech; social and regulatory considerations of nanotechnology; and the role of natural nanomaterials on contaminant behavior. [http://orbit.dtu.dk/files/126029937/NANO\\_Abstract\\_Program.pdf](http://orbit.dtu.dk/files/126029937/NANO_Abstract_Program.pdf)

## **BOOK OF ABSTRACTS: INTERFACES AGAINST POLLUTION — ENVIRONMENTAL CHALLENGES AND OPPORTUNITIES, 4-7 SEPTEMBER 2016**

University of Lleida, Catalonia, Spain. ISBN: 978-84-608-9990-7, 272 pp, 2016

The "Interfaces Against Pollution" series of conferences focuses on the understanding of phenomena relating colloids and interfaces with contaminants in environmental media. The study of the physicochemical mechanisms involved in the fate and behavior of pollutants in environmental compartments represents many opportunities for research, development, and innovation of novel monitoring tools, predictive models for the risk assessment of current and emerging substances, and technologies for contaminant remediation. <http://www.prf.jcu.cz/data/files/18/77/406/2331iap2016-book-of-abstracts.pdf>

The Technology Innovation News Survey welcomes your comments and suggestions, as well as information about errors for correction. Please contact Michael Adam of the U.S. EPA Office of Superfund Remediation and Technology Innovation at [adam.michael@epa.gov](mailto: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.