

# Technology Innovation News Survey

Entries for February 1-15, 2014

## Market/Commercialization Information

### INDUSTRY DAY FOR THE REGIONAL ENVIRONMENTAL ACQUISITION TOOL

Department of the Army, U.S. Army Corps of Engineers, USACE District, Savannah, GA.  
Federal Business Opportunities, FBO-4488, W912HN-SAD-ENVIR-REAT, 2014

The South Atlantic Division Industry Day for the Regional Environmental Acquisition Tool will be held April 15, 2014 (8:00 am - 4:30 pm), Sam Nunn Federal Building Conference Center, 61 Forsyth Street, SW, Atlanta, GA. Attendance is free, and registration will be required as seating is limited and will be on a first-come, first-served basis. This industry day will be conducted to provide information on the Regional Environmental Acquisition Tool that the South Atlantic Division will solicit over the next few fiscal years. The total capacity of this project is estimated at \$945 million, and 74% of the total capacity is reserved for the small business community. The types of environmental work to be solicited under this tool are Environmental Remediation Services (NAICS 562910); Environmental Consulting Services (NAICS 541620); Brooks-Act A-E Services (NAICS 541330); and Military Munitions (NAICS 562910). Registration information will be forthcoming. Interested parties are advised to check FBO.gov and [www.sas.usace.army.mil](http://www.sas.usace.army.mil) for updates.  
<https://www.fbo.gov/spg/USA/COE/DACA21/W912HN-SAD-ENVIR-REAT/Listing.html>

### IDIQ FOR TECHNICAL ASSISTANCE AND OVERSIGHT OF RESPONSE ACTIONS AT THE GE/HOUSATONIC RIVER SUPERFUND SITE, PITTSFIELD, MA

U.S. Army Corps of Engineers, USACE District, New England, Concord, MA.  
Federal Business Opportunities, FBO-4491, Solicitation W912WJ-14-R-0004, 2014

The USACE New England District plans to acquire a single contract to provide environmental consulting services, predominantly technical assistance and oversight, in support of the EPA Superfund program at the General Electric Housatonic River site. This will be a performance-based, firm-fixed-price, indefinite-delivery, indefinite-quantity environmental consulting services contract under NAICS code 541620, with an estimated contract amount of \$25 million. Work will begin in June 2014 and extend over a 5-year period. This project will be set aside for service-disabled, veteran-owned small business (SDVOSB) firms. The solicitation requirements and contract documents, including instructions for submission and the response date, will be available on or about March 28, 2014, at FBO.gov <https://www.fbo.gov/spg/USA/COE/DACA33/W912WJ-14-R-0004/Listing.html>

### EPA REGION 1 EMERGENCY AND RAPID RESPONSE SERVICES (ERRS) IV

U.S. EPA, Office of Acquisition Management, Region I, Boston, MA.  
Federal Business Opportunities, FBO-4493, Solicitation SOL-R1-14-00001, 2014

EPA Region 1 is conducting market research to identify parties having an interest in and the resources to support the requirement for Emergency and Rapid Response Services (ERRS) IV, NAICS code 562910. The results of this market research will contribute to determining the method of procurement. The estimated length of contract for this requirement is five or seven years with an estimated maximum contract value in the range of \$100-150 million. The purpose of the ERRS IV contract requirement is to conduct emergency responses, time-critical and non-time-critical removals, and remedial actions with respect to the release or threat of release of oil, hazardous and toxic wastes, petroleum products, hazardous substances, or pollutants, contaminants, or fire or explosion hazards, primarily within U.S. EPA Region 1, which includes the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, and 10 tribal nations. This effort will also include cleanup for incidents involving weapons of mass destruction, acts of terrorism, and chemical, biological, radiological, and nuclear incidents. Contractors must be able to maintain response capability 24/7 year-round. Responses are due by April 8, 2014, 2:00 pm ET.  
<https://www.fbo.gov/spg/EPA/OAM/Req1/SOL-R1-14-00001/Listing.html>

### FY15 ENVIRONMENTAL REMEDIATION SERVICES MULTIPLE AWARD CONTRACT, VARIOUS LOCATIONS, PRIMARILY ALASKA

Department of the Army, U.S. Army Corps of Engineers, USACE District, Alaska.  
Federal Business Opportunities, FBO-4492, Solicitation W911KB-14-S-ERS, 2014

The U.S. Army Corps of Engineers Alaska District is conducting market research to facilitate determination of acquisition strategy by identifying large business firms with the capabilities to perform the requirement. The Alaska District is contemplating an unrestricted, multiple-award, indefinite-delivery, indefinite-quantity contract with a capacity of around \$200 million to perform environmental remediation services in support of a wide range of customers. Environmental remediation services executed under the new IDIQ contracts would primarily include investigations, studies, engineering support, remedial designs, removal and remedial actions, and O&M activities for the Alaska District's Formerly Used Defense Sites program, Army and Air Force environmental programs, and the environmental programs of other non-DoD customers. Large business responses to this sources-sought are due by April 10, 2014, 2:00 pm AT. <https://www.fbo.gov/spg/USA/COE/DACA85/W911KB-14-S-ERS/Listing.html>

### SPECIAL NOTICE REGARDING A FUTURE PERFORMANCE-BASED REMEDIATION (PBR) EFFORT AT JOINT BASE MCGUIRE-DIX-LAKEHURST (JB MDL), NEW JERSEY

Department of the Army, U.S. Army Corps of Engineers, USACE District Tulsa, OK.  
Federal Business Opportunities, FBO-4493, Solicitation W912BV14S1000, 2014

The U.S. Army Corps of Engineers Tulsa District is soliciting industry review and comment on the advance government-furnished information provided in early planning to support the Government's requirement for a PBR effort at JB MDL, New Jersey. USACE Tulsa District in conjunction with the Air Force Civil Engineer Center is contemplating a performance-based approach for site closeout involving remedial action efforts (e.g., engineering, restoration, and remedial construction services) at ~110 Installation Restoration Program sites at JB MDL. This effort is a validated FY2014 requirement; however, funds are not currently available. Should the Government determine to proceed with this requirement, it will be unrestricted, procured using FAR Part 15 procedures, and result in a firm-fixed-price, performance-based, "C" type contract. Additional information is available at [https://drive.google.com/folderview?id=0BvOK\\_Tpp86LwZ041MkktSIRwT3c&usp=share](https://drive.google.com/folderview?id=0BvOK_Tpp86LwZ041MkktSIRwT3c&usp=share). Comments are requested by April 11, 2014.  
<https://www.fbo.gov/spg/USA/COE/DACA56/W912BV14S1000/Listing.html>

## Cleanup News

### SUPERFUND RECORD OF DECISION (ROD): HAMILTON/LABREE ROADS GROUNDWATER CONTAMINATION SUPERFUND SITE, CHEHALIS, LEWIS COUNTY, WASHINGTON, OPERABLE UNIT 1: INTERIM REMEDIAL ACTION

U.S. Environmental Protection Agency, Region 10, 188 pp, Aug 2013

Operable Unit 1 (OU1), also known as the Hamilton Road Impacted Area, is affected by several hazardous compounds, primarily PCE. The major components of the selected interim remedy for OU1 will be implemented in a phased approach that includes 1) diversion of Berwick Creek around contaminated areas; 2) in situ thermal treatment of sediment and soil with PCE concentrations >10 mg/kg; 3) removal and offsite disposal of remaining creek bed sediment and surface soil with PCE concentrations >10 mg/kg; 4) enhanced in situ bioremediation of remaining subsurface soil with PCE concentrations greater than 10 mg/kg; 5) enhanced in situ bioremediation of groundwater with PCE concentrations greater than 4,000 µg/L; 6) institutional controls; and 7) monitoring.  
<http://yosemite.epa.gov/R10/Cleanup.nsf/5c8919bc41f032578825685f006fd67?bb8c07954ded454e882568db0071ca6f1OpenDocument>

### PACIFIC COAST PIPELINE, FILLMORE, VENTURA COUNTY, CALIFORNIA

U.S. EPA Region 9 website, 2014

In 2013, ~42,000 cubic yd of Pb- and PAH-contaminated soil were excavated at the former Fillmore Texaco Refinery and placed in two on-site consolidation pits, which were capped. A multi-phase approach will be taken to address long-term remediation of benzene (~25 yrs) in the site's groundwater. Monitored natural attenuation (MNA) is being implemented in the northern plume, which has less benzene, and is estimated to take ~50 yrs to reach the cleanup goal. The remedy in the southern plume, which is scheduled to start in summer 2014, includes air sparging to stimulate naturally occurring bacteria to break down the benzene. After the air sparging, pumps will circulate the groundwater in the southern plume to move underlying sulfate-rich waters into the benzene plume. The sulfate will boost bacteria growth, which will continue to degrade the benzene. The MNA phase began for the northern plume in 2013 and will begin in the southern plume following completion of groundwater circulation around 2020. <http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/CAD980636781>

### POST-REMEDY EVALUATION OF IN SITU STABILIZATION USED TO TREAT SEVEN COMPOUND CLASSES IN A REMNANT INDUSTRIAL LAKE

Peterson, M.L., J.T. Spadaro, and S.F. Gormley.

Book of Abstracts: Seventh International Conference on Remediation of Contaminated Sediments, 4-7 February 2013, Dallas, Texas. Battelle Press, Columbus, OH. 2013

VOCs, SVOCs, metals, chlorinated herbicides, dioxins/furans, PCBs, and organochlorine insecticides were detected at elevated concentrations in the sediments of a shallow 1-acre lake remnant that received industrial wastes and stormwater over a period of ~40 years. The state regulatory agency approved in situ solidification/stabilization (ISS) of lake sediments as a remedial measure both to eliminate direct exposure pathways for human and ecological receptors and to minimize contaminant mobility and leaching. Full-scale ISS was implemented in 2010 using an amendment of Portland cement (20% weight/weight [w/w]), bentonite (5% w/w), organophilic clay (5% w/w), and granular activated carbon (5% w/w). Post-remedy sequential batch leachate tests and ...

groundwater monitoring results show that the ISS remedy effectively reduced or eliminated contaminant mobility and leaching consistent with the results of the treatability study for all seven constituent classes evaluated.

#### **ZIDELL REMEDIATION: REACTIVE CORE MAT AS A LOW-PROFILE CAP COMPONENT**

Faust, J., E. Bakkom, C. Lamb, M. Murray, and J. Olista.

Book of Abstracts: Seventh International Conference on Remediation of Contaminated Sediments, 4-7 February 2013, Dallas, Texas. Battelle Press, Columbus, OH. 2013

A 12-acre engineered sediment cap was needed to isolate sediment contamination (metals, PCBs, tributyltin, and PAHs) at a barge construction and former ship dismantling facility on the Willamette River in Portland, Oregon. Varying conditions along the riverfront required separation of the site into three design reaches that reflected specific operational requirements and changes in the fluvial environment. Because the nearshore activity of barge-moving tugs in this reach prevented the installation of a thick layer of sand as a cap, the design incorporated ~1 acre of low-profile reactive core mat (RCM) with rock armoring atop the geotextile in place of the standard 2-ft thickness of clean sand installed for the rest of the site. The sorbent or reactive characteristics of different media were evaluated to select the appropriate RCM fill, and pilot testing was conducted to assess the potential for fabric damage. Construction of the low-profile cap was completed by a dive team who worked with a crane derrick to lower RCM panels into place and then adjust panel placement to meet overlap requirements.

#### **PROPOSED PLAN: CIDRA GROUNDWATER CONTAMINATION SUPERFUND SITE, CIDRA, PUERTO RICO**

U.S. EPA Region 2, 37 pp, Nov 2013

EPA's proposed plan to clean up contaminated soil and groundwater in Cidra, Puerto Rico, at the Cidra Ground Water Contamination site calls for a combination of cleanup technologies within distinct areas of the site, specifically a dry cleaner business and a vacant property owned by Ramallo Brothers Printing, Inc. Groundwater at the site is contaminated with PCE, TCE, 1,1-DCE, cis-1,2-DCE, and vinyl chloride. Concentrations that exceed the soil saturation limit for PCE of 166 mg/kg indicate the potential presence of DNAPL. In the International Dry Cleaners area, EPA is proposing to use soil vapor extraction (SVE) to reduce the VOCs in the soil. In the Ramallo Brothers soil area, the plan includes removing and disposing of contaminated soil from a portion of the site, backfilling with clean soil, and using thermal treatment with SVE in other portions of the site. EPA also will place a cover or cap over soil in parts of the industrial area. EPA will inject chemicals into the groundwater to promote the breakdown of the pollutants, with the specific process to be determined as part of the design phase. In addition, EPA proposes to place restrictions on how the land may be used to limit people's exposure to contaminated groundwater and soil.

[http://www.epa.gov/region02/superfund/npl/cidra/Cidra\\_final\\_pp\\_11-19-13.pdf](http://www.epa.gov/region02/superfund/npl/cidra/Cidra_final_pp_11-19-13.pdf)

## **Demonstrations / Feasibility Studies**

#### **COUPLING OXIDATIVE AND REDUCTIVE TREATMENT TECHNOLOGIES FOR INTEGRATED SITE REMEDIATION**

Bryant, D., G. Maalouf, P. Sanderson, L. Simpkins, and B. Slack.

AquaConsoil 2013, 16-19 April 2013, Barcelona. 18 slides, 2013

At a site characterized by relatively high source area TCE concentrations, low permeability saprolite and highly transmissive bedrock, low natural attenuation, and a large plume area with limited accessibility, in situ chemical oxidation with potassium permanganate in the source area and in situ chemical reduction via zero-valent iron (ZVI) barriers in the downgradient plume area were implemented at pilot scale. Reagents were injected as high-solids slurries to distribute large reagent volumes effectively within specific and focused target zones in the low-permeability saprolite and a fractured zone in bedrock. Seven months of monitoring in the source area and 10 months in the plume area show that permanganate has persisted in the source area groundwater, with a radius of influence up to 40 ft and VOC reductions of 84-100%. Coring shows that the ZVI was distributed at least 15 ft horizontally from each boring, with associated shifts in pH and ORP. VOC reductions range from 46-100% downgradient of the barrier. Monitoring is ongoing to confirm the lifetime and effectiveness of the remedies. [http://www.aquaconsoil.org/Previous/AquaConSoil2013/Pres\\_Theme\\_D\\_files/D1.8\\_Bryant.pdf](http://www.aquaconsoil.org/Previous/AquaConSoil2013/Pres_Theme_D_files/D1.8_Bryant.pdf) For more detail, see the 42-slide presentation at [http://www.redux-tech.com/doc\\_download/77-9-simpkins-presentation.html](http://www.redux-tech.com/doc_download/77-9-simpkins-presentation.html).

#### **PROOF-OF-CONCEPT EVALUATION PROCESS: DESTRUCTION OF DNAPL THROUGH A GREEN TECHNOLOGY: PCE SOURCE AREA BIOREMEDIATION**

Armstrong, K.C., G. Bell, and I.R. Schaffner.

Book of Abstracts: Seventh International Conference on Remediation of Contaminated Sediments, 4-7 February 2013, Dallas, Texas. Battelle Press, Columbus, OH. 2013

A proof-of-concept evaluation using passive-release sock (PRS) deployment units containing the proprietary electron donor additive ERDenhanced™ demonstrated the remediation of chlorinated VOC DNAPL source mass in the highly weathered shale typical to southern Ontario. The site is a former dry cleaner located within an operating suburban strip mall. Preliminary full-scale remedial strategies included the installation of a subsal infiltration gallery during site redevelopment efforts. PRS units are 5-ft-long selectively permeable tubes designed to fit into existing 2-inch groundwater monitoring wells. Amendment-filled PRS units remain suspended within the screened interval of the impacted saturated zone, creating a minimal area of influence (

#### **SELF-SUSTAINING TREATMENT FOR ACTIVE REMEDIATION (STAR): IN SITU TESTING AND SCALE-UP FOR THE SMOLDERING COMBUSTION TREATMENT OF COAL TAR**

Grant, G., G. Scholes, D. Major, D. Reynolds, S. Dworatzek, J. Konzuk, and P. Dollar.

CleanUp 2013: 5th International Contaminated Site Remediation Conference, 15-18 September 2013, Melbourne, Victoria. Presentation D30, 17 slides, 2013

Self-sustaining treatment for active remediation (STAR) is a novel technology based on the principles of smoldering combustion where the contaminants are the source of fuel. In addition to aboveground compressors, blowers, and vapor-phase activated carbon or a thermal oxidizer, the specialized equipment associated with the STAR process includes the use of 2-inch diameter, carbon steel direct-push ignition wells with a stainless steel screen, temporary in-well heaters to initiate combustion, and subsurface multi-level thermocouple bundles to track the combustion process. An extensive STAR evaluation was conducted below the water table at a coal tar-impacted site in New Jersey, where shallow fill unit testing demonstrated sustained destruction rates >800 kg/day supported through air injection at a single well over a 4-day period, resulting in the destruction of >4,500 kg of coal tar. Deep sand unit testing (25 ft below the water table) resulted in the treatment of a targeted 6-ft layer of impacted fine sands to a radial distance of ~12 ft. Post-pilot sampling in both units showed a substantial reduction in coal tar volume within the target treatment zones, with contaminant concentrations reduced (on average) by >99% in zones where combustion was observed or detected.

**Slides:** [http://nebc.org/documents/EventFiles/Re-Use\\_2013/2B\\_Grant.pdf](http://nebc.org/documents/EventFiles/Re-Use_2013/2B_Grant.pdf) **Additional information:**

[http://www.cspg.org/documents/Conventions/Archives/Annual/2010/0292\\_GC2010\\_Self-Sustaining\\_Treatment\\_for\\_Active\\_Remediation.pdf](http://www.cspg.org/documents/Conventions/Archives/Annual/2010/0292_GC2010_Self-Sustaining_Treatment_for_Active_Remediation.pdf)

#### **FIELD APPLICATION OF PASSIVE TREATMENT OF CHLORINATED SOLVENTS USING NOVEL SUSTAINED-RELEASE OXIDANT TECHNOLOGIES**

Walsom, D.G. and P.J. Dugan.

Remediation Technologies Symposium 2013, 31 slides, 2013

RemOx® SR ISCO Reagent is a solid potassium permanganate sustained-release (SR) oxidant technology that utilizes paraffin wax as biodegradable matrix material for encapsulating permanganate. Paraffin protects the oxidant from instant dissolution and nonproductive reactions, is nontoxic, and facilitates sustained release of the oxidant over long periods of time through the processes of dissolution and diffusion. The oxidants can be formed as cylinders for direct push applications or inserted into holders for emplacement in wells. The material also can be chipped or cubed for hydrofracturing into low permeability media for treating back-diffusion of organic contaminants. This presentation covers the application, monitoring program, and results of the first Canadian field-scale pilot application of the RemOx® SR barrier technology in December 2012. The treatment was focused on back-diffusion of TCE and PCE from an off-site source following removal of contaminated soil and groundwater along a property boundary at a Southern Ontario site situated in a silty-clay environment.

**Longer abstract:** <http://www.esaa-events.com/remtech2013/2013abstracts/Abstracts%2027.pdf>

**Slides:** <http://www.esaa-events.com/proceedings/remtech2013/pdf/13-Walsom.pdf>

## **Research**

#### **PERCHLORATE DESTRUCTION AND POTABLE WATER PRODUCTION USING MEMBRANE BIOFILM REDUCTION: FINAL REPORT ADDENDUM**

Evans, P., J. Smith, C. Arucan, et al.

ESTCP Project ER-200541, 74 pp, Sep 2013

This report summarizes the findings of research carried out at Arizona State University in parallel with a field pilot study (detailed in the main project report at <http://www.clu-in.org/download/contaminantfocus/perchlorate/Perchlorate-R-200541-FR.pdf>). The overall project objective was biological treatment of a groundwater contaminated with nitrate and perchlorate in the H<sub>2</sub>-based Membrane Biofilm Reactor (MBfR). This treatment achieved microbial reduction of the contaminants into innocuous substances (nitrogen gas, water, and chloride), while not promoting sulfate reduction to sulfide. <http://www.serdp-estcp.org/content/download/23080/235167/file/ER-200541-FR%20Addendum.pdf>

#### **METRIC IDENTIFICATION AND PROTOCOL DEVELOPMENT FOR CHARACTERIZING DNAPL SOURCE ZONE ARCHITECTURE AND ASSOCIATED PLUME RESPONSE**

Abriola, L., E. Miller, K. Pennell, A. Ramsburg, and J. Christ.

SERDP Project ER-1612, 247 pp, Oct 2013

This research focused on the development of a comprehensive approach for field characterization of DNAPL source zones by quantifying the key features that control plume response. The intent was to integrate targeted (local-scale) in situ tests with transect-based observations of downstream contaminant flux or

concentration and information on subsurface geologic variability. The project aimed to identify metrics for linking NAPL architecture to plume response with in situ test methods and modeling tools and then integrate them with current machine-learning characterization methods to develop an overall source zone assessment protocol <http://www.serdp-estcp.org/content/download/23696/239727/file/ER-1612-FR.pdf>

#### COMPUTATIONAL AND EXPERIMENTAL INVESTIGATION OF CONTAMINANT PLUME RESPONSE TO DNAPL SOURCE ZONE ARCHITECTURE AND DEPLETION IN POROUS AND FRACTURED MEDIA

Sudicky, E., W. Illman, S. Frape, and T.-C.J. Yeh.  
SERDP Project ER-1610, 273 pp, Sep 2013

The main project objectives were to develop computational tools for predicting aqueous-phase plume response to DNAPL source zone architecture and depletion for both porous and fractured geologic media. The tools then were applied at a well-characterized fractured rock site at Smithville, Ontario, Canada. CompFlow simulations suggest that DNAPL penetration from the fracture into the matrix can take place in the carbonate units at the Smithville site. Model results support earlier estimates that the pump-and-treat system has recovered only a small volume of TCE; pump and treat has been ineffective in controlling the plume; and the stability of the plume is due to first-order degradation. However, application of multiphase compositional models such as CompFlow to realistic field-scale problems currently may be too time-consuming for feasible use <http://www.serdp-estcp.org/content/download/23765/240125/file/ER-1610-FR.pdf>

#### REMEDICATION OF PERFLUOROOCTANE SULFONATE IN CONTAMINATED SOILS BY MODIFIED CLAY ADSORBENT: A RISK-BASED APPROACH

Das, P., V.A. Arias, V. Kambala, M. Mallavarapu, and R. Naidu.  
Water, Air, & Soil Pollution, 224:1714, 2013

In an investigation of the removal of perfluorooctane sulfonate (PFOS) from water and fixation of PFOS in soil using MatCARE™, the novel modified clay adsorbent demonstrated faster adsorption kinetics (only 60 min to reach equilibrium) and higher PFOS adsorption capacity (0.09 mmol/g) of the MatCARE compared to a commercial activated carbon (0.07 mmol/g). Application of MatCARE (10% w/w) to PFOS-contaminated soil and incubation at 25 and 37°C at 60% of the maximum water-holding capacity of the soil for one year showed negligible release (water extractable) of the contaminant (only 0.5-0.6%). The fixation of PFOS in soil by the new adsorbent was exothermic in nature. Soil with higher clay and organic matter content but lower pH values retained PFOS to a much greater extent. A 40-second video that illustrates application of the novel adsorbent is posted at <http://www.youtube.com/watch?v=HZGNc-8n0ew>.  
Additional information: <http://www.crccare.com/case-study/fighting-fire-fighting-foam>.

#### COMPARING THE ELECTROREMEDIATION OF GLEYSOL SOIL CONTAMINATED WITH HYDROCARBONS WITH TRITON X-114 WASHING AND BIOREMEDIATION WITH SOLID CULTURES EMPLOYING AGROINDUSTRIAL RESIDUES

Alba, G.I., M.C. Cuevas, and E. Bustos.  
International Journal of Electrochemical Science, Vol 8, 4735-4746, 2013

Gleysol soil contaminated with hydrocarbons from Nuevo Teapa, Veracruz, Mexico, was used in 30-gram samples to test three different remediation treatments: soil washing with surfactant Triton X-114, biological treatment with solid culture, and electroremediation with 0.1 M sodium hydroxide. Biological treatment cost only \$2.23 US and had low toxicity (31%), but the removal took a very long time (360 h) for only 44.4% removal. Soil washing had an intermediate cost of \$4.88 US and needed only 5 h to achieve 11.9% hydrocarbon removal but had high toxicity (86%) due to the surfactant that remained in the soil matrix after treatment. Electroremediation was the most expensive treatment at \$12.51 US but needed only 3.5 h to achieve 81.9% hydrocarbon removal with a moderate toxicity of 40% <http://www.electrochemsci.org/papers/vol8/80404735.pdf>

#### A NEW COUPLED MODEL FOR SIMULATING THE MAPPING OF DENSE NONAQUEOUS PHASE LIQUIDS USING ELECTRICAL RESISTIVITY TOMOGRAPHY

Power, C., J. Gerhard, P. Tsourlos, and A. Giannopoulos.  
Geophysics, Vol 78 No 4, EN1-EN15, July 2013

A novel numerical model can provide a platform for the systematic evaluation of electrical resistance tomography (ERT) under a wide range of realistic, field-scale subsurface environments. The coupled model integrated a 3D multiphase flow model, which generates realistic DNAPL scenarios, with a 3D ERT forward model to calculate the corresponding resistivity response. Central to the coupling is a new linkage between the main hydrogeologic parameters and the resulting bulk electrical resistivity by integration of a variety of published relationships. A field-scale simulation of a DNAPL release and its subsequent remediation, monitored by ERT surface surveys, demonstrated the promise of ERT for mapping DNAPL mass reduction. As a cost-effective avenue to test optimum ERT data acquisition, inversion, and interpretative tools, the model should assist in deploying ERT strategically at DNAPL sites.  
[http://www.eng.uwo.ca/grc/pdfs/groundwater\\_remediation/coupled.pdf](http://www.eng.uwo.ca/grc/pdfs/groundwater_remediation/coupled.pdf)

#### HYDROGEOPHYSICAL INVESTIGATIONS OF THE FORMER S-3 PONDS CONTAMINANT PLUMES, OAK RIDGE INTEGRATED FIELD RESEARCH CHALLENGE SITE, TENNESSEE

Revil, A., M. Skold, M. Karaoulis, M. Schmutz, S. Hubbard, T. Mehlhorn, and D. Watson. Geophysics, Vol 78 No 4, EN29-EN41, July 2013

At the Oak Ridge site, contaminants from the former S-3 ponds have infiltrated the shallow saprolite for over 60 years. Two- and three-dimensional DC-resistivity tomography was used to characterize the number and location of the main contaminant plumes, which include high concentrations of nitrate. These contaminant plumes typically have an electrical resistivity in the range 2-20 ohm-m, while the background saprolite resistivity is in the range 60-120 ohm-m; thus, the difference of resistivity is easily mapped using DC-resistivity tomography to locate the contaminant pathways. With this method, investigators identified a total of five main plumes. They also used an active time-constrained approach to perform time-lapse resistivity tomography over a section crossing the plumes. The sequence of tomograms revealed the changes in the nitrate concentrations associated with infiltration of fresh water from a perched aquifer.  
[http://esd.lbl.gov/files/about/staff/susanhubbard/REVIL\\_2012\\_Hydrogeophysical\\_investigations.pdf](http://esd.lbl.gov/files/about/staff/susanhubbard/REVIL_2012_Hydrogeophysical_investigations.pdf)

#### THE ABUNDANCE OF TETRAHYDROFURAN/DIOXANE MONOOXYGENASE GENES (*thmA/dxmA*) AND 1,4-DIOXANE DEGRADATION ACTIVITY ARE SIGNIFICANTLY CORRELATED AT VARIOUS IMPACTED AQUIFERS

Li, M., J. Mathieu, Y. Liu, E.T. Van Orden, Y. Yang, S. Fiorenza, and P.J.J. Alvarez.  
Environmental Science & Technology Letters, Vol 1, 122-127, 2014

A primer/probe set was developed to target bacterial genes encoding the large hydroxylase subunit of a putative tetrahydrofuran/dioxane monooxygenase (an enzyme proposed to initiate dioxane catabolism). This effort relied on multiple-sequence alignment of the four *thmA/dxmA* genes available on the National Center for Biotechnology Information database ([www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov)). The probe targets conserved regions surrounding the active site, thus allowing detection of multiple dioxane degraders. A significant correlation was found between biodegradation rates and the abundance of *thmA/dxmA* genes, whereas 16S rRNA gene copy numbers (a measure of total bacteria) were neither sensitive nor reliable indicators of dioxane biodegradation activity. Overall results suggest that the novel catabolic biomarker *thmA/dxmA* has great potential for rapid assessment of the performance of degradation or attenuation of dioxane plumes.  
<http://alvarez.blogs.rice.edu/files/2014/01/175.pdf>

## General News

#### SERDP AND ESTCP WORKSHOP ON VAPOR INTRUSION INTO INDOOR AIR FROM CONTAMINATED GROUNDWATER

Unger, M., P. Johnson, A. Leeson, H. Stroo, and C. Lebron.  
Strategic Environmental Research and Development Program-Environmental Security Technology Certification Program (SERDP-ESTCP), 16 pp, 2014

SERDP/ESTCP sponsored the vapor intrusion (VI) workshop that was held in Tempe, Arizona, in December 2013 to develop a path forward for DoD investments in VI assessment. This report presents the resulting needs for VI research and technology transfer.  
<http://www.serdp-estcp.org/content/download/23758/240081/version/2/file/Vapor+Intrusion+Workshop+Report-Final.pdf>

#### MONITORED NATURAL RECOVERY AT CONTAMINATED SEDIMENT SITES

Blackman, T., M. Martin, G. Braun, S. Ozkan, and E. Ashley.  
Lockheed Martin Middle River Complex Feasibility Study Team, Project Note 2, 34 pp, 2013

To provide background for future sediment remediation at the Middle River Complex site, this Project Note gives a general description of monitored natural recovery (MNR), a partial list of sediment remediation projects where MNR has been applied, and several case study reviews of projects that utilized MNR as a component of the remedy.  
<http://www.lockheedmartin.com/content/dam/lockheed/data/corporate/documents/remediation/middle-river/NoteonMonitoredNaturalRecovery02-18-13.pdf>

#### 1,4-DIOXANE: THE EMERGING CONTAMINANT THAT KEEPS ON EMERGING

Mohr, T.  
Groundwater Resources Association of California, 62 slides, June 2013

This presentation by recognized expert Thomas Mohr provides background information on the use and occurrence of 1,4-dioxane; the chemical properties that govern its fate and transport; and challenges and solutions to its analysis in the laboratory. Field examples are provided to illustrate plume dynamics and ...

1,4-dioxane treatment challenges and costs. The final section discusses common misconceptions about the compound. [NOTE: The presentation begins on slide 9.] <http://www.grac.org/dioxane.pdf>

#### **PROGRESS IN THE MANAGEMENT OF CONTAMINATED SITES IN EUROPE**

Van Liedekerke, M., G. Prokop, S. Rabl-Berger, M. Kibblewhite, and G. Louwagie.  
European Commission, Joint Research Centre, Institute for Environment and Sustainability, EUR 26376, 72 pp, 2014

This report summarizes information on contaminated sites management obtained from the National Reference Centres for Soil from countries that belong to EIONET, the European Environment Information and Observation Network. Of the 36 network members, 27 participated in the voluntary 2011-2012 data collection campaign. Highlights of findings include:

- Soil contamination is suspected and detailed investigations will be needed at an estimated 2.5 million potentially contaminated sites in Europe.
- Of the ~115,000 contaminated sites that have been identified in Europe so far, nearly half (46%) have been cleaned up.
- Commonly used conventional techniques, such as excavation and off-site disposal, together account for about one-third of contaminated site management practices.
- Mining activities, metal industries, and gasoline stations are the most frequently reported sources, although polluting activities vary considerably from country to country.
- The most frequently occurring contaminants are mineral oils and heavy metals.

[http://ies.jrc.ec.europa.eu/news/663/354/Reference-Report-on-the-management-of-contaminated-sites-in-Europe/d.ies\\_highlights\\_details.html](http://ies.jrc.ec.europa.eu/news/663/354/Reference-Report-on-the-management-of-contaminated-sites-in-Europe/d.ies_highlights_details.html)

#### **INTRODUCTION TO IN SITU BIOREMEDIATION OF GROUNDWATER**

U.S. EPA, Office of Superfund Remediation and Technology Innovation.  
EPA 542-R-13-018, 86 pp, 2013

In situ bioremediation (ISB) of groundwater involves the stimulation of indigenous bacterial populations to metabolize target contaminants through the addition of various amendments to the subsurface environment. This text also explains bioaugmentation, in which select strains of bacteria are added to the subsurface. Bacteria can use different electron acceptors (oxidized compounds) and donors (reduced compounds) in the three major oxidation pathways: aerobic respiration, anaerobic respiration, and fermentation. ISB can use all of these pathways, and contaminant degradation might occur through direct metabolism, cometabolism, or abiotic transformations that result from biological activities.

[http://www.clu-in.org/download/remed/introductiontoinsitubioremediation@groundwater\\_dec2013.pdf](http://www.clu-in.org/download/remed/introductiontoinsitubioremediation@groundwater_dec2013.pdf)

#### **NEW YORK STATE BROWNFIELD CLEANUP PROGRAM: AN ASSESSMENT OF THE ECONOMIC, FISCAL, AND ENVIRONMENTAL IMPACTS**

Redevelopment Economics, Inc.  
Developers Brownfield Alliance, 67 pp, 2014

Adopted by New York State in 2003, its Brownfield Cleanup Program (BCP) offers a series of tax credits built into the state's tax law that incentivize voluntary cleanup of sites contaminated with hazardous waste or petroleum. Developers of these sites qualify for state tax credits. Based upon analysis of 96 brownfield development projects that earned a Certificate of Completion from the New York State Department of Environmental Conservation, this report provides a thorough analysis of the far-reaching impacts of BCP projects throughout the state. The report notes that program models in other states that focus only on the environmental cleanup have a much lower redevelopment success rate because developers can walk away from the site after remediation if tax dollars have already paid for the cleanup. An emphasis on redevelopment funding rather than cleanup alone leads to a much higher rate of project completion, and the nature of the tax credit has the maximum effect on private investment decisions.

[http://www.redevelomenteconomics.com/yahoo\\_site\\_admin/assets/docs/BCPeRort\\_FINAL\\_2-19.55104930.pdf](http://www.redevelomenteconomics.com/yahoo_site_admin/assets/docs/BCPeRort_FINAL_2-19.55104930.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.

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