Technology Innovation News Survey

Entries for May 1-15, 2016

Market/Commercialization Information

COMMUNITY HEALTH PROJECTS RELATED TO CONTAMINATION AT BROWNFIELD/LAND REUSE SITES

DHHS, Centers for Disease Control, Funding Opportunity CDC-RFA-TS16-1602, 3 May 2016

The ATSDR-sponsored community health projects related to contamination at brownfield/land reuse sites aim to prevent harmful exposures related to environmental contamination resulting from previous site uses. These projects will have a particular emphasis on identifying health issues prior to redevelopment or assessing changes in community health associated with reuse plans and redevelopment. Four awards in the form of cooperative agreements (award ceiling $150,000) are expected to result from the estimated total program funding of ~$600,000. Proposals must be submitted electronically no later than 11:59 PM ET on July 5, 2016http://www.grants.gov/web/grants/view-opportunity.html?oppId=283485

RADIATION HEALTH PROTECTION AND MEASUREMENTS INVOLVING RADIATION OR RADIOACTIVE MATERIALS

DHHS, Centers for Disease Control, Funding Opportunity CDC-RFA-EH16-1604, 2016

The purpose of this grant opportunity is to improve the understanding of radiation science to better protect the American public, workers, and emergency responders from exposure to radiation from natural, environmental, medical, and occupational sources as well as nuclear disasters. The results of this work will help improve the understanding of radiation science by the radiation protection community and will assist public health decision-making by federal, state, and local agencies. A single award of ~$300,000 is anticipated. Proposals must be submitted electronically no later than 5:00 PM ET on July 1, 2016http://www.grants.gov/web/grants/view-opportunity.html?oppId=283338

FY 2016 HAZARDOUS WASTE MANAGEMENT GRANT PROGRAM FOR TRIBES

U.S. EPA, Funding Opportunity EPA-OLEM-ORCR-16-04, 18 May 2016

EPA is soliciting proposals from federally recognized tribes or intertribal consortia for the development and implementation of hazardous waste programs and for building capacity to address hazardous waste management in Indian country. In accordance with the EPA Indian Policy of 1984, EPA recognizes tribal governments as the primary parties for managing programs for reservations. EPA anticipates making three awards, each with an award ceiling of $99,000. The closing date for applications is June 27, 2016.
http://www.grants.gov/web/grants/view-opportunity.html?oppId=283966

PROOF OF CONCEPT COMMERCIALIZATION PILOT PROGRAM

Department of the Army, Materiel Command, Funding Opportunity W911NF-16-R-0003, 2016

Among its many military needs areas, the Army's Environmental Chemistry program seeks to broaden and deepen the understanding of anthropogenic chemical transformation, transport, and fate in the troposphere, in soil, and in aqueous media, including single-particle and particle-particle interactions with the environment. The Army also seeks to gain understanding of the uptake and transformations of anthropogenics by living organisms. The results will help the Army to address technical needs in assessing chemical warfare agents and toxic industrial compounds, remediating hazardous areas, and accessing clean water resources in deployment areas. Prior to submitting a proposal, it is recommended to contact the technical POC for this needs area for additional information. The closing date for applications is September 15, 2016http://www.grants.gov/web/grants/view-opportunity.html?oppId=283584

SENSOR TECHNOLOGY FOR THE 21ST CENTURY

Small Business Administration, May 2016

This new resource is designed to help sensor developers locate Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) sensor technology development funding opportunities across federal agencies. The U.S. Government is a significant driver of sensor innovation, investing in low-cost, portable, easy-to-use technologies to facilitate the collection of reliable measurement information in real time. https://www.sbir.gov/Sensor-technology-for-the-21st-century

SMALL BUSINESS EVENT: ENVIRONMENTAL SMALL BUSINESS OUTREACH

U.S. EPA, Office of Small Business Programs, Washington, DC.
Federal Business Opportunities, FBO-5313, Solicitation Environmental_Outreach_2016, 2016

EPA's next environmental small business outreach meeting will be held July 12, 2016, from 10:00 AM to 12:00 noon in Room 1153 at EPA WJC East, 1201 Constitution Ave NW, Washington, DC 20460. Space is limited; only 2 representatives per firm may attend. Register to attend at https://www.surveymonkey.com/r/epy71216. For questions about this event, contact Anita Coleman atcoleman.anita@epa.gov. https://www.fbo.gov/notices/022a6c67f20910adc83bb1e0fe35ed50

RADIOLOGICAL EVALUATION ASSISTANCE (REA)

U.S. Nuclear Regulatory Commission (NRC), Rockville, MD.
Federal Business Opportunities, FBO-5313, Solicitation HQ-NMSS-16-0001, 2016

When NRC conducts routine and special inspections of sites to be decommissioned, NRC staff perform technical reviews of decommissioning documents, and plan and perform site visits and surveys to see if NRC's unrestricted use criteria are exceeded for present and future site uses. To accomplish these tasks, contractor assistance is required to provide survey instrumentation and laboratory analysis capabilities that are otherwise not available in-house to NRC as well as to augment staff technical expertise. NRC is conducting market research to determine the availability and potential technical capability of the business community to provide technical assistance. Capabilities statements are due via email by 3:00 PM ET on June 28, 2016.
https://www.fbo.gov/spg/NRC/OA/DCPM/HQ-NMSS-16-0001/listing.html

Cleanup News

MANAGING HIGH IRON LEVELS WHILE REMOVING 1,4-DIOXANE FROM GROUNDWATER

Woodard, S., D. Samorano, R. Luhrs, A. Bishop.
Emerging Contaminants Summit, March 1-2, 2016, Westminster, Colorado. 25 slides, 2016

A full-scale AMBERSORB™ 560 system was designed and installed for groundwater treatment of 1,4-dioxane and VOCs in the presence of high iron concentrations at a site located in Florida. The system was designed to treat 80-130 gpm of contaminated groundwater containing up to 2,500 µg/L 1,4-dioxane and 17,500 µg/L chlorinated VOCs. After brief operation of an iron pretreatment system (oxidant injection followed by catalytic media filtration), an alternative approach was tested that capitalized on the "zero-headspace" design of the Ambersorb system and the reduced nature of the groundwater (ORP <-100 mV). After a successful pilot demonstration, the full-scale oxidant feed system was turned off, which allowed the iron to pass through the treatment train in its reduced, dissolved Fe(II) state and discharge to the local POTW. Since system startup in October 2014, dioxane concentrations fell from the 80-240 µg/L range to consistently non-detect **Slides:** http://www.contaminantssummit.com/images/presentations/9_SteveWoodard.pdf
Poster: http://www.ect2.com/Portals/0/Downloads/managing-high-iron-levels-ect-battelle.pdf

WEST LAKE LANDFILL: ORGANIC POLLUTANT PHYTOFORENSIC ASSESSMENT

Burken, J.G.
State of Missouri, Office of Attorney General, 15 pp, 2015

In 2015 researchers at Missouri University of Science and Technology conducted a phytoforensic assessment of potential subsurface contamination in the area of the West Lake Landfill (WLL) to evaluate pollutant presence on site and pollutant migration off site in the area's shallow hydrogeology. Activities included evaluation of site historical data and plant sampling in the WLL area for target pollutants typical of landfill operations plus radionuclides. The plant-based sampling methodology is termed phytoscreening, a method for assessing polluted environments for a limited group of contaminants with properties and characteristics that allow plant uptake and translocation. Contaminant distribution in the vegetation at WLL and surrounding properties was highly indicative of off-site migration. Pollutants most commonly detected were chlorinated VOCs in the chlorinated ethane family and petroleum constituents (e.g., BTEX). The most commonly detected compounds were noted to be in clustered areas, supporting the conclusion that these particular contaminants were present in the subsurface rooting zone of the sampled trees. Potential sources were considered, and from the information reviewed, the most probable source of the pollution was concluded to be the WLL operation.
http://dnr.mo.gov/env/swmp/facilities/docs/burkenexpertopinionreport.pdf

Demonstrations / Feasibility Studies

SULFATE REDUCING BIOREACTOR DEPENDENCE ON ORGANIC SUBSTRATES FOR REMEDIATION OF COAL-GENERATED ACID MINE DRAINAGE: FIELD EXPERIMENTS

Lefticariu, L., E.R. Walters, C.W. Pugh, and K.S. Bender.
Applied Geochemistry, Vol 63, 70-82, 2015

Field experiments were conducted over a 460-day period to assess the efficiency of different mixtures of organic substrates to remediate acid mine drainage (AMD). Five pilot-scale, flow-through bioreactors containing mixtures of herbaceous and woody organic substrates along with one control reactor containing only limestone were constructed at the Tab-Simco site and exposed to AMD in situ. Results showed that the sequestration of sulfate and metals was achieved in all reactors; however, the presence and type of organic carbon matrix affected overall system dynamics and AMD remediation efficiency. The organic substrates removed more sulfate, Fe, and Al than the control. Increasing herbaceous content correlated with increased removal efficiency, while the intrinsic microbial community diversity was relatively unchanged. Extrapolation of pilot results to a full-scale Tab-Simco treatment system indicated that over the course of a 460-day period, the predominantly herbaceous bioreactors could remove up to 92,500 kg sulfate, 30,000 kg Fe, 8,950 kg Al, and 167 kg Mn, which represents a respective wt% removal efficiency increase of 18.3, 36.8, 4.1, and 82.3 compared to the predominantly ligneous bioreactors. A pretreatment phase to remove the bulk of dissolved Fe/Al-species from the influent AMD prior to entering the bioreactor is suggested for improving remediation capacity.
http://www.academia.edu/16129795/Sulfate_reducing_bioreactor_dependence_on_organic_substrates_for_remediation_of_coal-generated_acid_mine_drainage_Field_experiments

FIELD DEMONSTRATION OF VADOSE 1,4-DIOXANE REMEDIATION BY HEATED SOIL VAPOR EXTRACTION

Hinchee, R.
Emerging Contaminants Summit, March 1-2, 2016, Westminster, Colorado. 20 slides, 2016

A field site at the former McClellan Air Force Base, Calif., was selected for demonstration of a heated soil vapor extraction process called extreme soil vapor extraction (XSVE) to treat 1,4-dioxane remaining after conventional SVE treatment. The XSVE system was configured with four injection wells in a 20-ft square around a central extraction well. Off-gas was treated with an existing system. Well screen intervals were placed at ~38 to 68 ft bgs, corresponding to the soil interval containing the highest concentrations of dioxane. Soil moisture and temperature sensors were placed below the treatment zone to detect potential downward migration of dioxane from condensation. In-line heaters warmed the injected air, aiming for mid-screen injection well temperatures of ~110 to 115°C. After 12+ months of operation, temperatures within the treatment zone rose as high as 90°C, soil moisture readings dropped to zero in several locations, and dioxane concentrations in the extraction well discharge decreased 85%.
Slides: http://www.contaminantssummit.com/images/presentations/3_RobHinchee.pdf

Longer abstract: http://www.contaminantssummit.com/index.php/12-speaker-bios/162-rob-hinchee

BIOREMEDIATION OF COMINGLED 1,4-DIOXANE AND CHLORINATED SOLVENT PLUMES

Yuncu, B., J.L. Keener, R.C. Borden, S.D. Richardson, K. Glover, and A. Bodour.
Emerging Contaminants Summit, March 1-2, 2016, Westminster, Colorado. 25 slides, 2016

A field demonstration at a site co-contaminated with TCE and 1,4-dioxane is underway to evaluate the combined use of a methane-producing fermentable organic substrate with sequential oxygen generation to enhance in situ cometabolic biodegradation of both contaminants. The demonstration design consists of two treatment zones. An upgradient zone was formed by injecting diluted low-salt emulsified oil substrate (EOS LS) and chase water followed by a dechlorinating bacterial consortium (BAC-9) to enhance TCE treatment and accelerate methane production. The methane will serve as cosubstrate for aerobic cometabolism of dioxane in the downgradient oxygen barrier. Sixteen months after substrate injection, biological conversion of TCE was observed, as evidenced by the increased concentrations of cis-1,2-DCE, VC, and ethene in all injection wells and up to 40 ft downgradient of the treatment zone along with significant methane generation from oil fermentation. Dioxane concentrations unexpectedly appeared to decline in both injection and monitoring wells. Column studies are underway the better to understand the possible mechanisms for the dioxane decrease. A detailed site characterization of the study area was performed to illuminate the effects of complex subsurface flow paths on in situ bioremediation.
Slides: http://www.contaminantssummit.com/images/presentations/5_BilgenYuncu.pdf

EVALUATING THE EFFICACY OF A LOW-IMPACT DELIVERY SYSTEM FOR IN SITU TREATMENT OF SEDIMENTS CONTAMINATED WITH METHYLMERCURY AND OTHER HYDROPHOBIC CHEMICALS

Menzie, C., B. Amos, S.K. Driscoll, U. Ghosh, and C. Gilmour.
ESTCP Project ER-200835, 122 pp, 2016

Field demonstrations of in situ treatment of PCBs and mercury with activated carbon (AC) delivered using the SediMite® delivery system were conducted at two sites within Canal Creek at Aberdeen Proving Ground in Edgewood, Maryland. The application of SediMite to a third site—Bailey Creek at Fort Eustis in Virginia—is described for comparison along with data for a fourth site where SediMite was used to treat PCBs within *Phragmites* (reed) marsh. The sites represent different types of habitats, and the synoptic evaluation provides insights into the performance of SediMite as a delivery system for in situ treatment with AC across a range of biological and physical conditions. PCBs bioavailability typically was reduced by >80% across these sites, with values >90% achievable. Efficacy was related to the presence of target doses of AC. Results were equivocal for treatment of mercury. Most performance metrics for bioavailability rely on lab measures of field-collected samples; hence, there is some uncertainty regarding extrapolation to the field, but effects of treatment on native biota were judged to be negligible. This remedial option falls within a range of costs for other remedial alternatives.
https://www.estcp.com/content/download/39419/379369/file/Final%20Report%20ER200835%20February%202016%20FINAL%20FOR%20POSTING.pdf *See also the ESTCP Cost and Performance Report at* https://www.estcp.com/content/download/39402/379263/file/ER-200835-CP.pdf.

Research

PERMEABLE REACTIVE BARRIER TREATMENT FOR GROUNDWATER EXITING A NAPL CONTAMINATED AREA

Pope, D., S. Dore, C. Bucior, and A. Weston.
IPEC 2015, 25 slides, 2015

At the Michigan site described in this presentation, a study was performed to assess the insertion of a funnel-and-gate permeable reactive barrier (PRB) into a slurry wall, thereby to address NAPL-contaminated groundwater as it passes through the PRB gate. The contaminants include BTEX, naphthalene, trimethylbenzene, TCE, and cis-1,2-DCE. For an enhanced biodegradation PRB, organic amendments were mixed with sand for permeability and used to absorb the VOCs and increase their residence time in the gate's reactive zone. Biodegradation technologies tested included aerobic biodegradation—biosparging and the use of oxygen release compounds—and also addition of nitrate and/or sulfate to enhance anaerobic biodegradation. Results demonstrated that a biologically based PRB would be an effective treatment for VOCs in the site's groundwatehttp://ipec.utulsa.edu/Conf2015/Manuscripts/Pope_Permeable.pptx

THE FEASIBILITY OF TREE CORING AS A SCREENING TOOL FOR SELECTED CONTAMINANTS IN THE SUBSURFACE

Nielsen, Mette Algreen, Ph.D. thesis, Technical University of Denmark, DTU Environment, Kings Lyngby. 205 pp, 2015

This Ph.D. project had two primary objectives: (1) to investigate the feasibility of tree coring of different tree species as a screening tool for heavy metals, BTEX, and PAHs in the subsurface and (2) to investigate under which conditions and for which purposes tree coring is a viable substitute for established site screening methods, such as soil gas sampling. The first objective was achieved through tree core sampling campaigns from different tree species (e.g., willow, poplar, birch, cherry, and ash) at sites contaminated with heavy metals, BTEX, or chlorinated solvents. The measured wood concentrations were compared to concentrations in soil, groundwater, or soil gas. A lab study also was conducted to investigate plant PAH uptake from different soils. The second objective was accomplished by comparing wood concentrations attained through tree coring to measurements of soil gas, soil, and groundwater gathered using established site characterization methodshttp://orbit.dtu.dk/files/110735464/Mette_Algreen_Nielsen_PhD_thesis_FULL_Version_for_ORBIT.pdf

DOCUMENTING SPATIAL AND TEMPORAL VARIATIONS OF SUBSURFACE CONTAMINANTS USING TREE CORES: IMPLICATIONS FOR THE DESIGN OF EFFECTIVE WASTE MANAGEMENT STRATEGIES

Fonkwe, M.L.D.
Labrador Institute of Memorial University of Newfoundland, Canada. 46 pp, 2016

Research undertaken at the former landfill site of the Canadian Air Force Base, 5 Wing Goose Bay, in remote Happy Valley-Goose Bay, Labrador, used tree cores (trembling aspen, black spruce, and white birch) to study the presence of organic and inorganic contaminants in soil and groundwater. The project enabled an evaluation of how innovative tree coring can aid in efficient environmental assessment and monitoring in the early stages of site characterization. Compared with traditional techniques, such as drilling boreholes and monitoring wells for soil and groundwater sampling, the tree-core method is very simple, fast, and inexpensive to implement, and requires minimal field equipment. TCE was detected in only a few trees at the former landfill, whereas BTEX compounds and PCE were detected in most tree cores and indicated two zones of anomalously high concentrations. Tree species exhibited different concentrations of BTEX constituents and PCE, indicating selective uptake and accumulation. http://www.mun.ca/harriscentre////reports/Fonkwe_14-15_Waste.pdf

BIOGEOCHEMICAL GRADIENTS ABOVE A COAL TAR DNAPL

Scherr, K.E., D. Backes, A.G. Scarlett, W. Lantschbauer, and M. Nahold.
Science of the Total Environment, Vol 563-564, 741-754, 2016

At a site affected by historical coal tar DNAPL, the de facto absence of a plume sparked investigations regarding the character of natural attenuation and DNAPL resolubilization processes at the site. Steep vertical gradients of PAHs, microbial community composition, secondary water quality, and redox parameters were found to occur between the DNAPL proximal and shallow waters. While methanogenic and mixed electron-acceptor conditions prevailed close to the DNAPL, aerobic conditions and very low dissolved contaminant concentrations were identified in 3m vertical distance from the phase. Medium to low bioavailability of ferric iron and manganese oxides of aquifer samples was detected via incubation with *Shewanella* alga, and evidence for Fe and Mn reduction was collected. In contrast, 16S rDNA phylogenetic analysis revealed the absence of common Fe-reducing bacteria. Aerobic hydrocarbon degraders flourished in the shallow horizons, while nitrate reducers dominated in deeper aquifer regions, in addition to a low relative abundance of methanogenic archaea. Overall, slow hydrocarbon dissolution from the DNAPL appears to dominate natural attenuation processes. This site may serve as a model for developing legal and technical strategies for the treatment of DNAPL sites where contaminant plumes are absent or shrinking.

A DATA MINING APPROACH TO PREDICT IN SITU DETOXIFICATION POTENTIAL OF CHLORINATED ETHENES

Lee, J., J. Im, U. Kim, and F.E. Loeffler.
Environmental Science & Technology, Vol 50 No 10, 5181-5188, 2016

Researchers collected geochemical and microbial data sets from 35 wells at five contaminated sites and used them to demonstrate that a data mining prediction model constructed using the classification and regression tree (CART) algorithm can provide improved predictive understanding of a site's reductive dechlorination potential. The CART model successfully predicted reductive dechlorination potential three months in advance with 75.8% and 69.5% true-positive rate (i.e., sensitivity) for the training set and the test set, respectively. The machine-learning algorithm ranked parameters by relative importance for assessing in situ reductive dechlorination potential. The abundance of *Dehalococcoides mccartyi* 16S rRNA genes, methane, Fe_2^+, nitrate, nitrite, and sulfate concentrations; total organic carbon amounts; and oxidation-reduction potential displayed significant correlations ($p < 0.01$) with dechlorination potential, with nitrate, nitrite, and Fe_2^+ concentrations exhibiting precedence over other parameters. Contrary to prior efforts, the power of data mining approaches lies in the ability to discern synergetic effects between multiple parameters that affect reductive dechlorination activity. Overall, the findings demonstrate that data mining techniques (e.g., machine-learning algorithms) can utilize groundwater monitoring data effectively to derive predictive understanding of contaminant degradation, and thus have great potential for improving decision-making tools.

STATISTICAL ANALYSIS OF SECONDARY WATER QUALITY IMPACTS FROM ENHANCED REDUCTIVE BIOREMEDIATION

Tillotson, J.M. and R.C. Borden.
Groundwater Monitoring & Remediation, Vol 35 No 4, 67-77, 2015

Enhanced reductive bioremediation (ERB) is effective for treating a broad range of groundwater contaminants but may have secondary water quality impacts (SWQIs). Monitoring data from 47 ERB projects were analyzed to gain a better understanding of SWQI formation and extent. The analysis revealed that SWQIs occur at virtually every site, including reduced levels of background aqueous electron acceptors (O_2, nitrate, and sulfate), increases in dissolved-phase metals (Fe and Mn), and production of methane; however, the produced SWQI "plume" is usually confined within the original contaminant plume. As a result, SWQIs from ERB are unlikely to adversely affect potable water supplies. SWQIs do attenuate with distance downgradient, with concentrations often returning to near background levels. Results of the analysis were combined with previous research to develop a general conceptual model (CM) of SWQI production, mobilization, and attenuation. This CM can assist in identifying conditions where SWQIs may pose a concern, such as sites with low iron/high sulfate, high groundwater velocity, and low methane anaerobic oxidation rates.*See more information in a SERDP report at* https://www.estcp.com/content/download/38992/376111/file/ER-2131%20Final%20Report.pdf.

VISUALIZATIONS AND OPTIMIZATION OF IRON-SAND MIXTURES FOR PERMEABLE REACTIVE BARRIERS

Firdous, R. and J.F. Devlin.
Groundwater Monitoring & Remediation, Vol 35 No 4, 78-84, 2015

Diluting granular iron with sand is a common practice performed to minimize clogging and to reduce the cost of permeable reactive barrier installation. This study used a pore-scale image analysis technique and re-analysis of previously published data to test the hypothesis that the mixing of 15% by weight sand with a commercial, platy-grained Fe medium opens the pore space between grains, exposes more reactive grain surface to flowing water, and leads to a more reactive medium than 100% by weight granular Fe. Four mixing ratios (100, 85, 75, and 50% iron by weight) were compared on the basis of two morphological parameters measured in section: (1) total grain area, which correlates with the total amount of Fe present, and (2) grain perimeter, which is governed by both the mobile solution-available surface and the total amount of Fe present. As expected, grain areas exposed in section were highest for 100% Fe packings and decreased with increasing sand content. The estimated Fe grain effective perimeters (i.e., accessible to mobile water) for 85% Fe-by weight mixtures were similar to 100% Fe and decreased in 75 and 50% Fe mixtures. The section confirmed that the presence of 15% sand by weight opened up the pore structure, likely improving the mobile-water-to-Fe contact. *See also S. Firdous's dissertation at* https://kuscholarworks.ku.edu/handle/1808/12935. [Note: It might be necessary to copy and paste the URL into your browser for direct access.]

DEGRADATION OF ALDRIN AND ENDOSULFAN IN ROTARY DRUM AND WINDROW COMPOSTING

Alia, M., K.M. Gani, A.A. Kazmi, and N. Ahmed.
Journal of Environmental Science and Health: Part B, Vol 51 No 5, 278-286, 2016

Removal efficiencies, kinetics, and degradation pathways of aldrin, endosulfan alpha, and endosulfan beta in vegetable waste were evaluated during rotary drum and conventional windrow composting. The highest percentage removal of aldrin, endosulfan alpha, and endosulfan beta in rotary drum composting was 86.8, 83.3, and 85.3%, respectively, whereas in windrow composting it was 66.6, 77.7, and 67.2%, respectively. The rate constant of degradation of aldrin, endosulfan alpha, and endosulfan beta during rotary drum composting ranged from 0.410 to

0.778, 0.057 to 0.076, and 0.009 to 0.061/day, respectively. Metabolites dieldrin and 1 hydroxychlorodene formed during composting of aldrin in the vegetable waste indicated the occurrence of epoxidation reaction and oxidation of bridge carbon of aldrin containing the methylene group. Formation of chloroendic acid and chloroendic anhydride during composting of endosulfan containing vegetable waste support the occurrence of endosulfan sulfate and dehydration reaction respectively.

DEGRADATIONS OF 2,4-DICHLOROPHENOL AND POLYCHLORINATED BIPHENYLS WITH ZERO VALENT IRON UNDER SUBCRITICAL CONDITIONS: IMPORTANCE OF SUBCRITICAL WATER OXIDATION

Oh, S.-Y. and M.-K. Yoon.
Environment Protection Engineering, Vol 41 No 3, 73-86, 2015

Abiotic transformations of 2,4-dichlorophenol (DCP) and PCBs were examined in the presence and absence of zero-valent iron (ZVI) under subcritical conditions. DCP degradation was enhanced significantly, achieving complete degradation in 3 h at 300°C. Control experiments without ZVI revealed that DCP removal was due mostly to subcritical water oxidation. Regardless of ZVI presence, PCBs were decomposed rapidly: 93% destruction in 5 h at 300°C. Product identification using GC-MS suggested that ring cleavage, dechlorination, and polymerization might be involved in DCP and PCBs degradation with ZVI under subcritical conditions. A pilot-scale subcritical water oxidation demonstration unit is being designed and fabricated for field verification of these results. http://epe.pwr.wroc.pl/2015/3-2015/Oh_3-2015.pdf

IMMOBILIZATION OF CU AND AS IN TWO CONTAMINATED SOILS WITH ZERO-VALENT IRON: LONG-TERM PERFORMANCE AND MECHANISMS

Tiberg, C., J. Kumpiene, J.P. Gustafsson, A. Marsz, I. Persson, M. Mench, and D.B. Kleja.
Applied Geochemistry, Vol 67, 144-152, 2016

Samples from ZVI-treated and untreated plots were gathered from the sites of two field experiments where ZVI had been added 6 and 15 years earlier to investigate the long-term effect of ZVI amendments on copper and arsenic in contaminated soils. The ZVI remained reactive at both sites in that the dissolved concentrations of Cu and As were lower in the ZVI-treated than in the untreated soils. Cu speciation shifted from organic matter complexes in the untreated soil to surface complexes with iron (hydr)oxides in the ZVI-treated soil. ZVI did not have a stabilizing effect on Cu where pH was lower than 6 or 7. Immobilization of As was slightly pH-dependent and sensitive to competition with phosphate. If phosphate was ignored in modeling, arsenate dissolution was greatly underestimated. See additional discussion of this study in A. Marsz's Master's thesis at http://stud.epsilon.slu.se/6509/1/marsz_a_m_140317.pdf.

ADVICE ON MERCURY REMEDIATION OPTIONS FOR THE WABIGOON-ENGLISH RIVER SYSTEM

Rudd, J., R. Harris, and P. Sellers.
Asubpeeschoseewagong Netum Anishinabek (Grassy Narrows First Nation), ON, Canada, Working Group on Concerns Related to Mercury, 68 pp, 2016

The release of ~10 tonnes of mercury (Hg) to the Wabigoon River between 1962 and 1969 from a chlor-alkali facility at Dryden, Ontario, resulted in highly contaminated waters, sediments, and biota. After measures were carried out in the early 1970s to reduce Hg releases from the chlor-alkali facility, Hg concentrations quickly declined in sediments and fish, but since the 1990s the concentrations have stabilized or declined very slowly. This report reviews approaches to reduce Hg contamination in aquatic systems and identifies options with the potential for application in the Wabigoon-English River system. http://freegrassy.net/wp-content/uploads/2016/05/Wabigoon-English-River-System-Advice-on-Mercury-Remediation-Final-March-21a.pdf

RISKS AND EFFECTS OF THE DISPERSION OF PFAS ON AQUATIC, TERRESTRIAL AND HUMAN POPULATIONS IN THE VICINITY OF INTERNATIONAL AIRPORTS

Norstroem, K., T. Viktor, A.P. Cousins, and M. Rahmberg.
Swedish Environmental Research Institute, 62 pp, 2015

Due to the historical usage of aqueous film forming foams (AFFF) that contained per- and polyfluorinated alkylated substances (PFAS) during fire drills at Goeteborg Landvetter Airport and Stockholm Arlanda Airport, elevated PFAS concentrations were found in surface waters and fish in the vicinity of these airports. As a result of the findings, Swedavia Swedish Airport and IVL Swedish Environmental Research Institute Ltd IVL co-financed the RE-PATH project to study the long-term consequences of PFAS releases from firefighting training sites. Since project startup in 2009, about 700 samples have been collected and analyzed for their PFAS content. Toxicity tests were performed to investigate potential PFAS influence on reproduction, immobility, and hatching frequency. The sediment-water balance was studied to elucidate whether PFAS accumulated in sediments contributes substantially to water concentrations. Bioaccumulation and depletion potential was studied in goldfish, zebrafish, and crayfish. Additionally, the load of PFOS to Lake Maelaren was estimated and compared to releases from other sources. A mass balance model was developed to investigate the distribution and rate of decline of PFOS levels in the environment around Stockholm Arlanda Airport.
http://www.ivl.se/download/18.343dc99d14e8bb0f58b4ff0/1443169730471/B2232_RE-PATH%2BFINAL%2B(3).pdf

General News

DEVELOPMENT OF AN EXPANDED, HIGH-RELIABILITY COST AND PERFORMANCE DATABASE FOR IN-SITU REMEDIATION TECHNOLOGIES

McGuire, T., D. Adamson, C. Newell, and P. Kulkarni.
ESTCP Project ER-201120, 111 pp, 2016

The overall objective of this project was to develop a comprehensive remediation performance and cost database using results from numerous actual remediation projects. The project sought to expand the breadth and depth of the remediation performance and cost database compiled as part of a previous SERDP project (ER-1292) to provide a more powerful and reliable dataset. Several characteristics of remediation projects were evaluated to provide insights into factors that might affect remediation outcomes. In addition, key focus areas were studied to provide insights on sustained treatment versus rebound, performance of combined remedies, and performance at effectively remediated sites as described in the peer-reviewed literature. The performance database is based on 235 remediation projects. The resulting dataset indicates that concentration reductions of 0.5 to 2.0 orders of magnitude are typical when using the most common in situ remedial technologies for groundwater treatment of chlorinated solvents. *See the final report, the ESTCP cost and performance report, and the Excel decision support system at* https://www.estcp.com/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Persistent-Contamination/ER-201120.

WHAT IS THE EFFECT OF PHASING OUT LONG-CHAIN PER- AND POLYFLUOROALKYL SUBSTANCES ON THE CONCENTRATIONS OF PERFLUOROALKYL ACIDS AND THEIR PRECURSORS IN THE ENVIRONMENT? A SYSTEMATIC REVIEW PROTOCOL

Land, M., C.A. de Wit, I.T. Cousins, D. Herzke
Environmental Evidence, Vol 4 No 3, 13 pp, 2015

Although the production and use of some per- and polyfluoroalkyl substances (PFASs) has been phased out in some parts of the world, it is not known what effect these actions to date have had on PFAS concentrations in the environment. Owing to the wide diversity of PFASs, it is difficult to generalize their properties, environmental fate, and production histories; however, the strength and stability of the C-F bond renders the perfluoroalkyl moieties resistant to heat and environmental degradation. Several PFASs are now found even in very remote areas in large parts of the world, but the environmental transport and fate of substances within this group is not well understood. This paper proposes a systematic review to determine whether the concentrations of these substances in different environments are changing in any particular direction with time, and whether the phase-outs have had any effects on concentration trends.*This paper is* ***Open Access*** *at* http://link.springer.com/article/10.1186%2F2047-2382-4-3.

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