

Technology Innovation News Survey

Entries for August 1-15, 2015

Market/Commercialization Information

EPA REMEDIAL ACQUISITION FRAMEWORK: DESIGN ENGINEERING SERVICES

U.S. Environmental Protection Agency, Office of Acquisition Management, Washington, DC.
Federal Business Opportunities, FBO-5030, Solicitation SOL-HQ-14-00022, 2015

U.S. EPA plans a future procurement of professional A&E services to support Superfund remedial investigation, design, and oversight activities for Regions 1 through 10 under the Design Engineering Services portion of the Superfund Remedial Acquisition Framework. The purpose of this draft request for SF 330s is to solicit comments and questions regarding the planned procurement and to encourage vendors to test the Microsoft Access SF 330 form (Attachment 4 at FedBizOpps) and the FedConnect electronic submission system. A draft SF 330 submitted through FedConnect for this test can be blank or without substantive information. Test submissions must be completed by 5 PM ET on Monday, September 21, 2015. Vendors can expect a confirmation of receipt from EPA for test submissions by the following business day. The official request for SF 330s will be issued at a later date.
<https://www.fbo.gov/spg/FBPA/QAM/HQ/SOL-HQ-14-00022/listing.html>

EMERGENCY RESPONSE TO AUGUST 2015 RELEASE FROM GOLD KING MINE

U.S. Environmental Protection Agency, Office of Acquisition Management, Washington, DC.
Federal Business Opportunities, FBO-5032, Solicitation SOL-HQ-15-00012, 2015

EPA is developing an information resource for contracting officers and contractors working on behalf of the Agency in support of activities concerning the Gold King Mine incident. A list at <http://www.epa.gov/oasrprod/ersc/osc/goldkingminevendor-list.pdf> identifies potential vendors and contractors, and other vendors or contractors interested in doing business related to the Gold King Mine incident may send an email to Michael Barton, Contract Specialist, at Barton.Michael@epa.gov, with the information specified in the FedBizOpps notice. EPA has not evaluated the listed firms in any way, and inclusion on the list does not constitute endorsement. <https://www.fbo.gov/spg/FBPA/QAM/HQ/SOL-HQ-15-00012/listing.html>

TECHNOLOGY COMMERCIALIZATION OPPORTUNITY: SHEAR HORIZONTAL SURFACE ACOUSTIC WAVE BIOSENSOR

U.S. Department of Energy, Sandia Corp., Sandia National Laboratories, Albuquerque, NM.
Federal Business Opportunities, FBO-5030, Solicitation 15_445, 2015

Sandia National Laboratories (SNL) is seeking partners to further develop and commercialize a high-frequency, shear-horizontal surface acoustic wave (Love wave) sensor that employs an acoustic cavity to store mechanical energy. The biosensor is designed for monitoring biological capture events suited to environmental detection and medical diagnostics. A sensitivity of 625 cm^2/gm and detection limit of 0.1 pg has been demonstrated. SNL submitted a U.S. patent application for "Shear Horizontal Surface Acoustic Wave (SH-SAW) Resonators and Arrays Thereof," on August 17, 2015. SNL invites interested parties to provide a detailed description of relevant background, experience, expertise, and capabilities that could be brought into a collaborative partnership with Sandia for commercializing this technology. Cooperative Research and Development Agreements and licensing agreements are available. Submit expressions of interest by 11:59 PM ET, November 30, 2015. https://www.fbo.gov/spg/DOE/SNL/SN15_445/listing.html

REMEDIATION OF CHEMICAL AGENT-CONTAMINATED SOILS AND DEBRIS

Department of the Army, Army Contracting Command, ACC-Rock Island, IL.
Federal Business Opportunities, FBO-5031, Solicitation W52P1J15R0077, 2015

The Joint Project Manager for Elimination (JPM-E) has issued a solicitation for services to demonstrate the remediation of simulated mustard agent-contaminated soils with a thermal desorption system. The tasks in the contract include development and government approval of a detailed plan for test conditions for a non-incineration thermal desorption system with a proposed simulant for the agent mustard; provisioning of all the equipment, materials, and trained personnel to perform the tests; execution of the tests according to the test plan; and generation of a report documenting the test results and conclusions. The test plan may include laboratory and/or bench-scale tests if deemed necessary by the offeror. The demonstration tests are to be performed with a thermal desorption system that can process 2-3 m^3 of the mustard-simulant spiked soil considered the most difficult to process to a concentration of 100 mg/kg . <https://www.fbo.gov/notices/40c8728e3248459d9183bc16b0c48061>

DIRECT PUSH DELINEATION PHASE II

U.S. Army Corps of Engineers, USACE District, Philadelphia, Philadelphia, PA.
Federal Business Opportunities, FBO-5042, Solicitation W912BU-15-T-0073, 2015

The U.S. Army Corps of Engineers, Philadelphia District, plans to initiate an RFQ to delineate the remaining subsurface VOC soil contamination (xylenes, toluene, and ethylbenzene) at the Cosden Chemical Coatings Superfund site in Beverly, New Jersey. The contractor is to conduct seven direct-push borings using the Membrane Interface Probe/Hydraulic Profiling Tool (MIHPT) to a depth of 35 ft bgs to delineate vertical and horizontal extent of the existing VOC contamination; obtain seven soil and seven aqueous samples; submit all data in electronic format; and provide visualization of data in Earth Vision® or equivalent. Surveying of completed borings will be completed by USACE. The contractor will have 81 calendar days to complete the contract. This procurement is 100% set-aside for small business, NAICS code 541990, size standard of \$1.5M. The solicitation likely will be issued on or about September 29, 2015, with a closing date on or about October 29, 2015, at 1400 hours. <https://www.fbo.gov/spg/USA/COE/DACA61/W912BU-15-T-0073/listing.html>

Cleanup News

SITE SS023 CORRECTIVE MEASURES IMPLEMENTATION REPORT, PART 1

Beale Air Force Base, California, Project No. BAEY20147501PB, 108 pp, July 2015

This report summarizes the optimization of the interim corrective measures and documents that the final remedy is in place at Site SS023. In situ chemical oxidation (ISCO), enhanced attenuation, and land use controls were selected to address PCE and TCE in the groundwater. These measures follow a pilot test of dynamic underground stripping with hydrous pyrolysis oxidation (2001-2003) that reduced TCE and PCE concentrations in groundwater by 85 and 91%, respectively, and an ozone sparge system that operated from 2005 to 2012. For the ISCO portion of the remedy, four injection wells were constructed and developed in June 2014, baseline sampling was conducted, sodium permanganate was injected into new and existing wells, and monitoring was performed from November 5, 2014, to January 23, 2015. During the baseline sampling event (July 2014), the highest TCE concentration detected in a groundwater sample was 564 $\mu\text{g/L}$. The detection of TCE in groundwater collected from the new wells confirms the presence of a residual TCE mass in the groundwater.
<https://clu-in.org/download/tech/us/chemox/ISCO-Beale-2015.pdf>

BIOFILM REMEDIATION OF ALUMINUM, IRON AND MANGANESE USING "MICROCHIP WETLAND" METAL REMOVAL UNITS (MRUs)

Lennox, C.A.
Proceedings of the West Virginia Mine Drainage Task Force, March 31-April 1, 2015, Morgantown, WV. 4 pp & 26 slides, 2015

Patent-pending Metal Removal Units are located on six geographically and chemically distinct sites throughout western Pennsylvania to remove total iron, aluminum, and total manganese from impacted waters (as secondary or tertiary treatment steps) to below total maximum daily loads. The modular MRUs are referred to as microchip wetlands due to the high density of their treatment volume compared to conventionally constructed wetlands. To pull dissolved and precipitating metal loads from impacted waters, MRUs promote the growth of large volumes of microbial biofilm on a structural matrix of coconut coir. The units can be arranged in multiple patterns and scaled to accommodate mineral loading and flow rate. This presentation discusses the specifics of MRU construction and capability and notes performance at several installations.
Slides: <http://wvmdtaskforce.com/proceedings/15/Lennox.pdf>
Paper: <http://wvmdtaskforce.com/proceedings/15/Lennox-paper.docx>

COST SAVING AND PERFORMANCE ENHANCEMENTS AT THE RUSHTON AMD PLANT

Dietz, J.M.
Proceedings of the West Virginia Mine Drainage Task Force, March 31-April 1, 2015, Morgantown, WV. 49 slides, 2015

The Rushton Acid Mine Drainage (AMD) Treatment Plant is located near Phillipsburg, Pennsylvania. The Rushton plant treats between 2,500 and 5,000 gpm of mine water from a partially flooded underground coal mine complex, which is pumped to control water levels and prevent mine water from breaking out at unwanted locations in the watershed. Active treatment of AMD at the Rushton Mine involves the use of hydrated lime to raise the pH, neutralize acidity, and precipitate dissolved metals in the AMD. Mechanical mixing solubilizes the hydrated lime (as a slurry), and aeration oxidizes soluble Fe(II) and Mn(II) to insoluble and oxidized metal precipitates. The Rushton plant also uses polymer addition to flocculate small particles into rapidly settling larger particles in large quiescent settling ponds for suspended solids removal. The settled solids are collected and removed by automated submersible pumps mounted on cable-driven floating rafts and then disposed of within the deep mine via injection wells. This presentation describes modifications made at the treatment plant in recent years to improve system performance and lower overall treatment costs.
Slides: <http://wvmdtaskforce.com/proceedings/15/Dietz.pdf>
Longer abstract: <http://wvmdtaskforce.com/proceedings/15/Dietz-paper.docx>

MOVING BED BIOFILM REACTOR FOR SELENIUM REDUCTION IN MINE EFFLUENTS

Dale, C.
Proceedings of the West Virginia Mine Drainage Task Force, March 31-April 1, 2015, Morgantown, WV. 24 slides, 2015

Biological treatment of selenium found in mine effluents as selenate and selenite requires anoxic conditions and the presence of an electron donor, usually an organic carbon compound. The moving-bed biofilm reactor (MBBR) process, which has been used successfully to treat mine effluents, utilizes a polyethylene carrier with a high protected surface area for biofilm development. The carriers are maintained in continuous motion in the reactor, thereby avoiding the need for backwashing or issues with gas entrapment. In mine applications, the process typically consists of a 2-stage MBBR reactor followed by solids separation. Denitrification and partial selenium reduction occur in the stage one MBBR, while stage two removes any residual Se. The process has been used at full scale to treat a mine effluent in West Virginia, achieving a total Se concentration of 0.1 mg/L .
Slides: <http://wvmdtaskforce.com/proceedings/15/Dale.pdf>
Paper: http://www.violliawaterstna.com/vwst-northamerica/resources/documents/1/40084_Caroline-Dale-Wastewater-treatment.pdf

SELF SUSTAINING TREATMENT FOR ACTIVE REMEDIATION (STAR): DESIGN AND IMPLEMENTATION AT A COAL-TAR IMPACTED SITE

de Vlaming, L.A.
Abstracts: 14AICH, 16-21 November 2014, Atlanta, Georgia. No 380748, 2014

Self-sustaining Treatment for Active Remediation (STAR) is based on the principles of smoldering combustion, where the contaminants are the source of fuel. This new treatment method allows for sustainable in situ treatment of recalcitrant organic compounds (coal tar residuals, heavy hydrocarbons) within a network of locally installed treatment points. At a former coal tar processing site in Newark, New Jersey, three phases of pilot testing were conducted to verify treatment effectiveness and develop full-scale deployment methods. The tests supported evaluation of key design parameters, such as contaminant mass destruction rates, treatment radius of influence, and vapor emission levels. Pilot testing has demonstrated sustained coal tar destruction rates in excess of 800 kg/d as supported through air injection at a single well. Deep testing (25 ft below the water table) achieved the treatment of a targeted 6-ft layer of fine sands to a radial distance of $\sim 12 \text{ ft}$. The full-scale STAR design consists of ~ 1800 specific treatment locations plus customized unit operations to remediate a 14-acre footprint of contaminated soil from startup in 2014 through mid-2016.
Slides: http://www.aigp.org/sections/GA/pdf/2014%20Seminar/7-Thompson_STAR_04%2016%2014.pdf
Poster: http://www.mgpcconference.com/wp-content/uploads/2014/02/29_GRANT.pdf

NAVAL AIR STATION JACKSONVILLE: ENVIRONMENTAL RESTORATION TEAM AWARD, FY 2013

NAS Jacksonville Partnering Team.
Environmental Restoration Individual/Team Award, 7 pp, 2014

The NAS Jax Team was recognized for its implementation of innovative technologies at OU3 to improve the conceptual site model of DNAPL (PCE, TCE, and DCE) distribution and aid in the design of future remediation systems. The team used a variety of approaches:

- High-resolution sampling of aquifer sediment and groundwater to delineate and estimate the amount of DNAPL mass diffused into low-permeability layers.
- Membrane interface probe to characterize the geotechnical properties of clay layers and the presence of DNAPL contamination.
- On-site mobile laboratory and multilevel sampling equipment to delineate in real time the presence of clay layers and develop detailed profiles of contaminant mass in clay layers.
- Modeling tools to evaluate the natural attenuation of contamination through long-term diffusion and biodegradation in clay layers.

The use of these and other innovative characterization, remediation, and monitoring technologies at OU3 resulted in an estimated cost avoidance of \$2.5M at NAS Jax, and the successes and lessons learned through demonstration of the innovative technologies have been shared throughout the Navy. http://greenfleet.dodlive.mil/files/2014/03/ER-IT_NAS-Jacksonville_FY13.pdf

AMERICAN CREOSOTE WORKS INC., (WINN PARISH), LOUISIANA U.S. EPA Region 6 Update, 4 pp, 2015

The contaminants of concern are carcinogenic PAHs, pentachlorophenol, VOCs, and dioxins. Remedial activities for in situ biological treatment of contaminated soil and pump and treat of liquid contaminants are ongoing. Contaminated soils and sludges in the central process area and buried pits are addressed through in situ biological treatment stimulated by injection of nutrients, microbes, and oxygen into the subsurface. The groundwater extraction system used for groundwater and NAPL recovery also provides for hydraulic control to inhibit off-site migration of contaminated groundwater. On average, over 600,000 gal of contaminated ground water is collected and treated per month, including over 500 gallons of NAPL, which is transported off-site to a permitted facility for incineration. Treated ground water is either reinjected as part of the in situ biological treatment process or discharged to Creosote Branch Creek via permitted outfall. <http://www.epa.gov/region6/fsst/pdffiles/american-creosote-la.pdf>

Demonstrations / Feasibility Studies

CHESTER RIVER HOSPITAL CENTER PILOT TEST EVALUATION REPORT AND PROPOSED 2015 ACTION PLAN

Maryland Department of the Environment (MDE), 128 pp, 2015

The Chester River Hospital Center (CRHC) Technical Team implemented a pilot study in August 2014 to demonstrate the viability and effectiveness of the Ivey-sol® surfactant flushing push-pull process to safely liberate sorbed residual hydrocarbons from soils. CRHC had used pump and treat (P&T) for over 20 years to remove liquid petroleum hydrocarbons (free product) and remediate the groundwater. Based on the evidence of monitoring results, the project moved into a closure status/process during 2012/2013; however, subsequent monitoring data led to the restart of P&T, and investigations revealed that a seasonal high water table contacted sorbed residual hydrocarbons in a smear zone in soils near the original spill. In July 2014, MDE approved the proposed Ivey-sol® pilot study under a set of specific conditions. The push-pull flushing process was completed successfully, and CRHC proposed its use at full scale to complete the cleanup. MDE approved the revised action plan (with modifications) in July 2015. <https://clu-in.org/download/techfocus/ISF/Ivey-Sol-Pilot-Test-Eval-2015.pdf>
Follow up on this project in reports on the MDE Oil Control Program Remediation Sites page at http://www.mde.state.md.us/programs/land/OilControl/RemediationSites/Pages/Programs/Land/Programs/Oil_Control/RemediationSites/index.aspx.

COST-EFFECTIVE, ULTRA-SENSITIVE GROUNDWATER MONITORING FOR SITE REMEDIATION AND MANAGEMENT

Halden, R.U. and I.B. Roll.
ESTCP Project ER-201122, 176 pp, 2015

A new water sampling method and device have been developed for solid-phase extraction in the field. The In Situ Sampler (IS2) generates preconcentrated samples, provides time-integrated data, and reduces sample size and handling. The IS2 does not require calibration because concentration data are derived directly from the mass of analyte recovered from the sorbent cartridge and the known volume of water processed. This preconcentration step provides significant magnification of analyte concentration, improving reporting limits. The samples returned by the IS2 weigh only a few grams but may represent chemical constituents of kilograms of water, making handling and shipment of large numbers of samples significantly more cost effective. The IS2 was demonstrated for fuel components, including naphthalene, at the former Williams AFB in Mesa, Arizona, and for Cr(VI) at Naval Air Station North Island. This report includes a cost analysis of the IS2 demonstrations. At the research stage, the IS2 is similar in price to other practices and can be expected to improve in cost-effectiveness if brought to market. <https://www.estcp.com/content/download/137248/338542/file/ER-201122-FR.pdf> See also the project summary presentation: <https://www.estcp.com/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Monitoring/ER-201122-FR-201122-Project-Summary-Presentation>.

Research

UNDERSTANDING DIOXIN-LIKE COMPOUNDS IN INDOOR DUST

Cline, P.V.
Protect Gainesville's Citizens Inc., 99 pp, 2014

A study was funded by a grant from EPA's Environmental Justice Small Grant Program to a community organization, Protect Gainesville's Citizens Inc., to evaluate the concentrations and patterns of dioxins and dioxin-like compounds in indoor dust from homes near the former Koppers wood treating Superfund site in Gainesville, Florida. In 2012 EPA collected the initial samples from 30 homes, 17 of them adjacent to the Koppers site. Potential dioxin-like contributions from flame retardant chemicals present in foam furniture or electronics in the homes were also investigated. No dust sample had a concentration above 100 ppt. Indoor dioxin data were evaluated before and after the Koppers surface soil remediation. http://www.alachuacounty.us/Dents/epd/Pollution/Documents/1658_PGC%20ISEPA%20Indoor%20Dioxin%20Dust%20Study%20Report%2011-30-2014.pdf See additional information at <http://www.alachuacounty.us/Dents/epd/Pollution/Pages/CabotKoppersSuperfund.aspx>.

MICROBIAL LEACHING OF CHROMIUM FROM SOLIDIFIED WASTE FORMS: A KINETIC STUDY

Ayyappan, C.S.
Journal of Ecological Engineering, Vol 16 No 3, 36-42, 2015

Thiobacillus thiooxidans was used in a study of the microbial stability and degradation of cement-based waste forms. The waste forms contained a chromium salt and cement, plus lime and gypsum in two different proportions. Waste form samples showed evidence of microbial growth as indicated by substantial increase in sulfate. After 30 days of exposure, Cr leached from the waste forms was found to be lowest from cement-lime solidified waste forms (0.061 mg/L) and highest from cement-gypsum waste forms (0.22 mg/L)—both values lower than the TCLP regulatory limit of 5 mg/L. When model equations based on two shrinking core models (acid dissolution and bulk diffusion) were used to analyze the microbial degradation kinetics, the bulk diffusion model was the better fit as indicated by good correlation coefficients. <http://www.jeeeng.net/pdf-2803-2824?filename=MICROBIAL%20LEACHING%20OF%20>

STATISTICAL SAMPLE SIZE FOR QUALITY CONTROL PROGRAMS OF CEMENT-BASED SOLIDIFICATION/STABILIZATION

Fenton, G.A., R. Liza, C.B. Lake, W.T. Menzies, and D.V. Griffiths.
Canadian Geotechnical Journal, [e-first article] 1-9, Aug 2015

Sampling requirements for the QC of cement-based solidification/stabilization (S/S) construction cells currently do not specify the sample size for considering either the accuracy of the estimated effective cell hydraulic conductivity from the samples or the risk associated with drawing the wrong conclusions about cell acceptability. Probabilistic simulations were performed to examine the influence of a soil-cement material's mean, variance, and correlation length on sampling requirements for a QC program of cement-based S/S construction cells. The sampling requirements were determined by considering a hypothesis test, having nullified that the constructed material is unacceptable and targeting access such as E. *hirsum* can help to guide plant management practices and optimize phytoremediation processes in constructed wetlands affected by metal, metalloids, and organic pollutants. <http://www.mdpi.com/2073-4441/7/2/1697/pdf>

BIOMONITORING OF *EPILOBIUM HIRSUM* L. HEALTH STATUS TO ASSESS WATER ECOTOXICITY IN CONSTRUCTED WETLANDS TREATING MIXTURES OF CONTAMINANTS

Guittony-Philippe, A., V. Masotti, J. Rabier, M.-E. Petit, L. Malleret, B. Coulomb, and I. Laffont-Schwob.
Water, Vol 7 No 2, 697-715, 2015

In Europe, hairy willow-herb (*Epilobium hirsutum* L.) is a common fast-growing species. Its suitability as a phytoindicator of contaminant toxicity was tested over a study period of 113 days in microcosm constructed wetlands variously containing a metal and metalloid mixture (MPM); an organics mixture (OPM); and an organics, metal, and metalloid mixture (OMPM). The type of pollutant mixture affected metal uptake patterns, resulting in variation of toxicity symptoms in *E. hirsutum* plants. Some effects were similar under MPM and OPM conditions (leaf chlorosis and tip-burning, decrease of green leaf proportion), while others were characteristic of each pollutant mixture (MPM: Decrease of water content, increase of phenol content; OPM: reduction of limb length, inhibition of vegetative reproduction, increase of chlorophyll content and N balance index). Results demonstrate that phytoindicators such as *E. hirsutum* can help to guide plant management practices and optimize phytoremediation processes in constructed wetlands affected by metal, metalloids, and organic pollutants. <http://www.mdpi.com/2073-4441/7/2/1697/pdf>

GLO-ROOTS: AN IMAGING PLATFORM ENABLING MULTIDIMENSIONAL CHARACTERIZATION OF SOIL-GROWN ROOT SYSTEMS

Relan-Alvarez, R., G. Lobet, et al.
Elife, [e-first article] Aug 2015

Root systems develop different root types that individually sense cues from their local environment and integrate this information with systemic signals. An integrated imaging system called Growth and Luminescence Observatory for Roots (GLO-Roots) uses luminescence-based reporters to enable studies of root architecture and gene expression patterns in soil-grown, light-shielded roots. Image-analysis algorithms allow the spatial integration of soil properties, gene expression, and root system architecture traits. GLO-Roots systems can be used to present environmental stimuli to roots in ways that evoke natural adaptive responses while allowing for study of the multi-dimensional nature of plant response. GLO-Roots studies may be relevant to establishing strategies for sustainable and drought-tolerant agriculture and potentially to conducting phytoremediation feasibility studies for cleanup projects. <http://elifesciences.org/content/4/15/08191/fig1> Full PDF: <http://www.carnegiescience.edu/node/1864>

REMOVAL OF ARSENIC AND SULFATES FROM AN ABANDONED MINE DRAINAGE BY ELECTROCOAGULATION: INFLUENCE OF HYDRODYNAMIC AND CURRENT DENSITY

Del Angel, P., G. Carrero, J.L. Nava, M.T. Martinez, and J. Ortiz.
International Journal of Electrochemical Science, Vol 9, 710-719, 2014

This paper presents a study of arsenic and sulfate removal from abandoned mine drainage in Guanajuato, Mexico (As 24 µg/L, sulfate 3567 mg/L, pH 7, and conductivity 3.56 mS/cm) by electrocoagulation, using aluminum as the sacrificial anode in a continuous filter press reactor. Arsenic concentration decreased from 24 µg/L to 1.8 and 2 µg/L at current density of 4 and 6 mA cm⁻², respectively, at a mean linear flow velocity of 1.82 cm/s, thereby reaching the goal of the World Health Organization standard for arsenic in water (CAS <http://www.electrochemsci.org/papers/vol9/90200710.pdf>)

DETECTION OF MIXING DYNAMICS DURING PUMPING OF A FLOODED COAL MINE

Elliot, T. and P.L. Younger.
Groundwater, Vol 52 No 22, 251-263, 2014

The utility of isotopic environmental tracers—C-, H-, O-, S- stable isotopic analyses, and age indicators (C-14, H-3)—for evaluating mixing dynamics is illustrated by the analysis of a pumping test in an extraction borehole drilled into flooded, abandoned coal mine workings at Deerplay (Lancashire, UK). Interpretation of the isotope data was undertaken in conjunction with that of major ion hydrochemistry, and interpreted in the context of the particular hydraulic setting of flooded mine workings to identify the sources and mixing of waters in the groundwater system. The overall aim of the test pumping—to replace an uncontrolled outflow from a mine entrance in an inconvenient location with a pumped discharge in a location where treatment could be provided—was swiftly achieved. Environmental tracing data illustrated the benefits of pumping as little as possible to attain this aim, as higher rates of pumping induced in-mixing of poorer quality waters from more distant old workings and renewed pyrite oxidation in the shallow subsurface. http://pure.nyu.ac.uk/portal/files/11823268/Elliot_Younger_2014.pdf

COST EFFECTIVE SCREENING OF MINE WATERS USING ACCESSIBLE FIELD TEST KITS: EXPERIENCE WITH A HIGH SCHOOL PROJECT IN THE WONDERFONTEINSPRUIT CATCHMENT, SOUTH AFRICA

Fyffe, L., H. Coetzee, and C. Wolkersdorfer.
Uranium: Past and Future Challenges. Springer, New York. ISBN: 978-3-319-11058-5, 565-572, 2015

Although conventional water quality monitoring is costly and often requires complex procedures, simple water quality tests exist for parameters that can be used to identify potential contamination related to mining. These simple tests were applied as part of a high school science project to look at the environmental impact of gold and uranium mining in the upper Wonderfonteinpruit. The results allowed identification and characterization of mine-affected water and demonstrated the ability of volunteer monitoring programs using simple technologies in mining environments to complement the work done by regulators, operators, and researchers.

INTELLIGENT MINE WATER TREATMENT: RECENT INTERNATIONAL DEVELOPMENTS

Wolkersdorfer, C., D.V. Lopes, and E. Nariyan.
Sanierte Bergbaustandorte im Spannungsfeld zwischen Nachsorge und Nachnutzung: WISSYM 2015. Paul, M. (ed). Chemnitz (Wismut GmbH). 63-68, 2015

Each mine water is unique, and no ground-breaking technology is available that could be described as the silver bullet for mine water treatment; however, several technologies, if developed further, have great potential for extensive use in active mine water treatment. Adsorption, though much discussed, currently is not ready to replace chemical treatment of mine effluents, though it will become a promising technology once valuable elements can be recovered from the (ad)sorbents and reused on a large scale. No full-scale mine water treatment plant using sorbents is in operation at the time of this writing. Of the technologies studied, the most promising active treatment options for the future appear to be (in no specific order) membrane technologies, ion exchange, and electrochemical methods (with and without membrane support)—all of them potentially assisted by biological approaches. <http://www.wolkersdorfer.info/publication/pdf/Intelligent%20Mine%20Water%20Treatment%20Recent%20International%20Developments.pdf>

CHARACTERIZATION OF THE BACTERIAL AND SULPHATE REDUCING COMMUNITY IN THE ALKALINE AND CONSTANTLY COLD WATER OF THE CLOSED KOTALAHTI MINE

Bomberg, M., M. Arnold, and P. Kinnunen.
Minerals, Vol 5 No 3, 452-472, 2015

Mine drainage effects from closed mines potentially can be abated using indigenous and introduced sulfate-reducing bacteria (SRB) to effect metal precipitation at the mining site. The Kotalahti Mine (Finland) was flooded after closure, and sulfate reduction and metal precipitation was induced by addition of pig manure sludge into the Vehkankuili shaft. When water was sampled in the Vehkankuili and Olinkuili shafts at 10, 30, 70, and 100 m depths 15 years after treatment, the water in the shafts differed biologically and geochemically. The shafts are not directly connected except by some fracture zones, and the Olinkuili shaft is used as a reference for environmental monitoring. The bacterial communities in both shafts contained methylotrophic gamma-Proteobacteria, hydrogenotrophic and methylotrophic beta-Proteobacteria, and fermenting bacterial clades. SRB concentration was low. Despite the success of the mine as an in situ bioreactor for increasing water pH and removing sulfate and heavy metals by induced sulfate reduction under suboptimal temperature, only a small portion (<http://www.mdpi.com/2075-163X/5/3/452/htm>)

WATER TREATMENT WITH PRESSURE CAVITATION

Mitton, M.
Proceedings of the West Virginia Mine Drainage Task Force, March 31-April 1, 2015, Morgantown, WV. 27 slides, 2015

Cavitation is the formation and collapse of powerful micro-bubbles that occurs in liquids. Engineers have developed a simple, robust chemical cavitation reactor that requires very little energy (e.g., 1 kW to treat 1000 gal) to combine and separate materials on an industrial scale. It can induce cavitation both under pressure and under a vacuum and can accommodate coarse, heterogeneous slurries. This technology has many potential applications, including water treatment (e.g., remediation of produced water from drilling operations) and remediation of oil sands tailings and bitumen recovery. <http://www.mdtaskforce.com/proceedings/15/MITTON.pdf>

ASSESSMENT OF ALTERNATIVES OF URBAN BROWNFIELD REDEVELOPMENT: APPLICATION OF THE SCORE TOOL IN EARLY PLANNING STAGES

Garcao, Rita, Master's thesis, Chalmers University of Technology, Goeteborg, Sweden. 155 pp, 2015

SCORE is a multi-criteria analysis tool to evaluate remediation strategies that combines a cost-benefit analysis and a semi-quantitative evaluation of environmental and social effects. The SCORE tool was developed for assessing remediation alternatives in the risk valuation process in the late planning phases, when typically a substantial amount of information is available. This study evaluated the possibilities for application of SCORE in the early planning phase and presents sustainability assessment results of redevelopment alternatives at the Fixfabriken site, an urban brownfield located in Goeteborg, Sweden. Because the consequences of the different future land uses were difficult to assess with the current SCORE design, this paper presents two recommendations for future modifications of the economic domain of the tool to enhance SCORE application to the redevelopment decision-making process. <http://publications.lib.chalmers.se/records/fulltext/219167/219167.pdf>

EXTRACTION AGENTS FOR THE REMOVAL OF POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) FROM SOIL IN SOIL WASHING TECHNOLOGIES

Lau, E.V., S. Gan, H.K. Ng, and P.E. Poh.
Environmental Pollution, Vol 184, 640-649, 2014

The main factor that governs the efficiency of soil washing or solvent extraction for removing PAHs contamination is the solubility of PAHs in the extraction agent. Past field-scale soil washing treatments for PAH-contaminated soil have mainly employed organic solvents or water, which is either toxic and costly or inefficient in removing higher molecular weight PAHs. This paper presents a review of the alternative extraction agents that have been studied, including surfactants, biosurfactants, microemulsions, natural surfactants, cyclodextrins, vegetable oil, and solution with solid-phase particles. These extraction agents have been found to remove PAHs from soil at percentages ranging from 47-100% for the different PAHs.

General News

USE OF MONITORED NATURAL ATTENUATION FOR INORGANIC CONTAMINANTS IN GROUND WATER AT SUPERFUND SITES

U.S. EPA, Office of Solid Waste and Emergency Response.
OSWER Directive 9283.1-36, 83 pp, Aug 2015

This new monitored natural attenuation (MNA) directive for inorganic contaminants expands upon and is designed to be a companion to the 1999 MNA guidance. Together, these two policy documents provide guidance on the consideration of MNA for a broad range of contaminants at Superfund sites. Both directives say that multiple lines of evidence should be obtained to evaluate the feasibility of including MNA in the site's selected response action. This 2015 guidance builds upon the approach indicated in the 1999 directive for tiered analysis of site characteristics that control and sustain attenuation, and recommends a phased analytical approach tailored specifically for inorganic contaminants. Both guidance documents are available at <http://www.epa.gov/superfund/health/connmedia/gwdocs/monit.htm>

COMPILATION OF INFORMATION RELATING TO EARLY/INTERIM ACTIONS AT SUPERFUND SITES AND THE TCE IRIS ASSESSMENT

U.S. EPA, Office of Superfund Remediation and Technology Innovation, 3 pp, 27 Aug 2014

In response to requests from U.S. EPA Regional offices, this memorandum compiles information regarding existing EPA guidance on early or interim actions at Superfund sites. The memo also provides current information about the toxicity of TCE. The information referenced in this document may be used to support Superfund decision-making at sites with actual or potential inhalation exposures to TCE. http://www.epa.gov/superfund/sites/npl/TCE_compilation_final.pdf

TRICHLOROETHENE (TCE) IN INDOOR AND OUTDOOR AIR

New York State Department of Health, 9 pp, 2015

The New York State Department of Health in August released three new fact sheets on TCE. Following the updated reference concentration recommended by U.S. EPA, the state has lowered its chronic TCE exposure standard from 5 µg/m³ to 2 µg/m³, and it has set 20 µg/m³ as the default level for taking "immediate and effective action" to protect the fetuses of pregnant women in the first trimester of pregnancy. All three fact sheets are available at <http://www.health.ny.gov/environmental/chemicals/trichloroethene/>.

The Technology Innovation News Survey welcomes your comments and suggestions, as well as information about errors for correction. Please contact Michael Adam of the U.S. EPA Office of Superfund Remediation and Technology Innovation at adam.michael@epa.gov or (703) 603-9915 with any comments, suggestions, or corrections.

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