

Technology Innovation News Survey

Entries for February 16-28, 2021

Market/Commercialization Information

NORTHWESTERN DIVISION REGIONAL \$115M SECTION 8(A) SB SET-ASIDE IDIQ MATOC FOR ENVIRONMENTAL REMEDIATION SERVICES

U.S. Army Corps of Engineers (USACE) Seattle District, Seattle, WA.
Contract Opportunities at Beta.SAM, Solicitation W912DW21R0022, 2021

This acquisition is an 8(a) small business set-aside under NAICS code 562910. Via this IDIQ MATOC (multiple-award task-order contract) with a target of up to five awardees, the USACE Seattle District aims to support its existing customers along with new customers within the Northwestern Division's area of responsibility (i.e., the districts of Seattle, Portland, Walla Walla, Kansas City, and Omaha). A 3-year base ordering period plus a 2-year option is intended for each of the five contracts under a ceiling of \$115M for combined. The anticipated work encompasses full environmental remediation and restoration services, including incidental construction, site characterization and assessment, abatement of asbestos or lead, and removal services. Per- and polyfluoroalkyl substances (PFAS) site investigations, remedial investigations, and/or remedial actions are also anticipated. Offers are due by 10:00 AM PT on April 15, 2021. <https://beta.sam.gov/opp/files/498fb7348dd897b8e8d97f7d6/view>

A-E SHORTLIST FOR USDA-FS, REGION 8 AND 10, 2021

USDA, Forest Service, Region East 11, Atlanta, GA.
Contract Opportunities at Beta.SAM, Solicitation 12445121R0005, 2021

The USDA agencies and specifically the USDA Forest Service utilize a Short Selection database to award A-E contracts of less than \$250,000 in the states/territories of Alabama, Alaska, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Nebraska, North Carolina, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Virginia, Washington State, Puerto Rico, and U.S. Virgin Islands. All projects under \$250,000 are total small business set-asides. Updated and new A-E qualifications are requested for 2021 via Standard Form 330 (SF-330) for USDA's Forest Service, Southern Research Station, Pacific Northwest Research Station, Institute for International Tropical Forestry, and other USDA agencies. Among the many types of work represented in the database are several of potential interest to environmental services contractors, such as coordination of RCRA and other waste disposal, and environmental (RCRA, CERCLA, CWA, etc.) reviews, audits, investigations, and inventories. SF-330s are due by 12:00 noon Alaska Time on April 16, 2021. <https://beta.sam.gov/opp/09564c1be1774d68b34d1a0770d8b0d54/view>

MEGA SERVICE DISABLED VETERAN OWNED SMALL BUSINESS (SDVOB) PRE-PLACE REMEDIAL ACTION CONTRACT (PRAC)

U.S. Army Corps of Engineers (USACE), Kansas City District, Kansas City, MO.
Contract Opportunities at Beta.SAM, Solicitation W912DQ21R3001, 2021

This solicitation is a service-disabled veteran-owned small business (SDVOB) set-aside under NAICS code 562910. As an IDIQ MATOC (multiple-award task-order contract) with a target of five awardees, the Pre-placed Remedial Action Contract will support work assigned to the USACE Northwestern Division and EPA Region 2 for a wide range of remedial action services at hazardous and radiological waste sites for both civilian and military agencies of the federal government. The maximum value for all orders issued against the contract is \$22.5M. Offers are due by 2:00 PM CT on April 22, 2021. <https://beta.sam.gov/opp/735f6d7e807c494aa5e7b75d1ab6c7e/view>

\$240M ENVIRONMENTAL REMEDIATION SERVICES (ERS) UNRESTRICTED MATOC

U.S. Army Corps of Engineers (USACE), Omaha District, Omaha, NE.
Contract Opportunities at Beta.SAM, Solicitation W9128F21R0033, 2021

The Government intends to solicit and award an unrestricted MATOC (multiple-award task-order contract) under NAICS 562910. The MATOC will facilitate awarding a target of up to 10 IDIQ contracts with a total contract capacity of \$240M for environmental remediation services in support of the U.S. Army Corps of Engineers, Northwestern Division and existing customers. Task orders will be issued as the need arises during the ordering period. Task orders may be firm-fixed-price and cost-plus-fixed-fee as identified in the solicitation. Offers are due by or before 2:00 PM CT on April 26, 2021. <https://beta.sam.gov/opp/8a1571b21366d4313b4434cf3ef013eb13/view>

FY 2021 REGION 10 HEALTHY, RESILIENT AND SUSTAINABLE COMMUNITIES GRANT PROGRAM

Environmental Protection Agency, Funding Opportunity RFA-R10-HRSC-2021, 2021

U.S. EPA Region 10 is requesting applications from eligible entities to improve community health and resilience through sustainable materials management implementation and/or pollution prevention, i.e., any practice that reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment prior to recycling, treatment, or disposal. Sustainable materials management can reveal new opportunities to reduce environmental impacts, conserve resources, and reduce costs. Eligible entities include Region 10 states, local governments, city or township governments, independent school district governments, state-controlled institutions of higher education, nonprofit organizations, nonprofit private institutions of higher education, community-based grassroots organizations, and federally recognized tribes and intertribal consortia. Eligible projects must take place within EPA Region 10, which includes Alaska, Idaho, Oregon, and Washington. Four awards are anticipated out of estimated program funding of \$120,000. The closing date for applications is April 30, 2021. <https://www.grants.gov/web/grants/view-opportunity.html?oppId=331752>

UNDERGROUND MINE EVACUATION TECHNOLOGIES AND HUMAN FACTORS RESEARCH

Centers for Disease Control and Prevention, Funding Opportunity RFA-OH-21-006, 2021

The purpose of this funding program is to provide grant opportunities to universities with graduate programs in mining and explosives engineering to 1) support research related to mine emergencies, and 2) build on the work of NIOSH to address mandates in the Mine Improvement and New Emergency Response Act of 2006. Research priorities include developing new wireless communication devices and methodologies; developing training, systems, and tools to facilitate miner self-escape, and continuing to improve the design of refuge alternatives. Other possible research areas of interest include health and safety issues in related areas, particularly those related to mine emergencies caused by mine fires and explosions. Interested applicants are encouraged to consider aspects of their graduate program in mining and explosives engineering, including unique facilities that could best support research related to mine emergencies. A single award is anticipated out of estimated funding of \$1M. The closing date for applications is February 1, 2022. <https://www.grants.gov/web/grants/view-opportunity.html?oppId=328769>

Cleanup News

MULTISTAGE REMEDIATION OF HEAVY METAL CONTAMINATED RIVER SEDIMENTS IN A MINING REGION BASED ON PARTICLE SIZE

Ma, T., Y. Sheng, Y. Meng, and J. Sun. | Chemosphere 225:83-92(2019)

Sediment contents and heavy metal fractions based on particle size (PS) were studied to assess the feasibility of chemical leaching and stabilization for the remediation of heavy metal-contaminated sediment. Fine sediments (PS < 75 mm) were found to retain 79.8% of the heavy metals. For sequentially extracted fractions, residual fraction dominated the total content for PS > 150 mm, while the oxidizable fraction, reducible fraction, and weak acid extractable fraction dominated the total content in fine sediments, except for that of Hg. A total of 145,000 m³ sediment was divided based on PS and synchronously washed by eluting agents. The clean sediments (PS > 150 mm) were used as building material and clean backfill, and heavily polluted sediments (PS < 150 mm) were stabilized and buried as general industrial solid waste. Over 90% of the contaminated sediments were reused throughout multistage remediation. Furthermore, waste, ecological risk, and resources were reduced. <https://www.sciencedirect.com/science/article/pii/S00456535193333724934/1/Multistage%20remediation%20of%20heavy%20metal%20contaminated%20river%20sediments%20in%20a%20mining%20region%20based%20on%20particle%20size.pdf>

PERFORMANCE EVALUATION OF THE NORTH FORK MONTOUR RUN PASSIVE TREATMENT SYSTEM

Danehy, T.P., R. R. Waters, M. Mahoney, C.A. New, C.F. Deane, and D.A. Guy.
36th Annual Meeting of the American Society of Mining & Reclamation, 3-7 June, Big Sky, MT, 40 slides, 2019

A passive treatment system installed to treat acidic, Fe- and Al-bearing coal mine drainage was evaluated for both chemical and hydraulic performance in 2018, the wettest year on record in Pittsburgh, Pennsylvania. As the system was overwhelmed both chemically and hydraulically, the maximum performance that can be expected from this seasoned passive treatment system was quantified. https://www.asrs.us/Portals/0/Documents/Meetings/2019/PowerPoints/BA_1100_Danehy.pptx

ACID MINE DRAINAGE REDUCTION EFFORTS RESTORE TOMHICKEN CREEK

Office of Water, EPA 841-F-21-001C, 2 pp, 2021

Abandoned mine drainage (AMD) discharges to 3.5 miles of Tomhicken Creek, a tributary of Catawissa Creek, in 2003 and 2005, PADEP approved a total maximum daily load (TMDL) of runoff and finalized the Catawissa Creek Watershed Implementation Plan. The TMDL assessment targeted load reduction goals for acidity, Fe, and Al. Two passive treatment systems were installed, significantly reducing metals and acidity and raising the pH and alkalinity of Tomhicken Creek. Approximately 3.5 miles of the creek improved and now meet water quality standards prompting removal from the state's list of impaired waters for aquatic life. https://www.epa.gov/sites/production/files/2021-01/documents/pa_tomhicken_creek_1873_508.pdf

25 YEARS OF ACID MINE DRAINAGE REMEDIATION OF THE CHEAT RIVER WATERSHED: CHALLENGES, SUCCESSES, AND FUTURE RESTORATION EFFORTS

Ball, M. | Pennsylvania Mine Reclamation Conference, 28-29 October, Virtual, 30 minutes, 2020

The West Virginia-based Friends of the Cheat (FOC) has worked for over 25 years to restore the Cheat River and its tributaries from the impacts of acid mine drainage caused by legacy coal mining. This presentation examines the challenges of implementing watershed-scale remediation, the importance of diverse and dynamic partnerships, and future efforts to restore the watershed holistically. <https://www.youtube.com/watch?v=H7W0B8p9B6k>
More information: https://www.epa.gov/sites/production/files/2016-07/documents/wv_progress_-_rebirth_of_the_cheat_river_-_20160609.pdf

MONITORING BROWN TROUT INVASION INTO A NATIVE BROOK TROUT STREAM POST MINE DRAINAGE REMEDIATION: A CAUTIONARY TALE

Clark, T.J. | Pennsylvania Mine Reclamation Conference, 28-29 October, Virtual, 16 minutes, 2020

The fish assemblage of Kratzer Run, one of two primary AMD-impacted tributaries to Anderson Creek in the West Branch Susquehanna River Subbasin, is unique. The mainstem of Kratzer Run contains a Class A wild population of mostly brown trout despite its iron content. Bilger Run, the largest tributary to Kratzer Run, also contains a wild population almost exclusively of native brook trout. Construction of two AMD treatment systems on Bilger Run may remove this water quality barrier, allowing brown trout to invade Bilger Run and outcompete the native brook trout. This presentation describes the unique brown/brook interactions in Kratzer and Bilger Runs, how those interactions may change with improving Bilger Run quality, and the methods employed to document that change. <https://www.youtube.com/watch?v=Q7n7ln9YU0I>

NONPOINT SOURCE SUCCESS STORY: REMEDIATING ABANDONED MINES IMPROVES WATER QUALITY IN TURKEY CREEK

EPA Office of Water, EPA 841-F-20-001M, 2 pp, 2020

Remediation on the Golden Belt and Golden Turkey mines was completed in 2007. Approximately 190,000 cubic yards of mine tailings and almost 54,000 cubic yards of waste rock along Turkey Creek were moved away from the floodplain and contained onsite using a variety of surface control measures. Measures include a cap that for stabilization and to prevent further runoff or erosion of the waste piles, regrading and revegetating, establishing proper drainage channels, minimizing runoff erosion, and installing a continuous down-slope AZDEQ riprap structure following remediation to document water quality improvements. Remediation has improved the water quality in Turkey Creek. Removing the mine tailings and waste rock piles from the floodplain decreased Cu and Pb loads in the creek by 58% and 80%, respectively. Further water quality monitoring needs to be completed before Turkey Creek can be removed from Arizona's impaired waters list. https://www.epa.gov/sites/production/files/2020-08/documents/az_turkey_creek_1835_508.pdf

Demonstrations / Feasibility Studies

EVALUATION OF ROTATING CYLINDER TREATMENT SYSTEM™ AT ELIZABETH MINE, VERMONT

Office of Research and Development Land Remediation and Technology Division, EPA/600/R/19/194, 55 pp, 2020

This report presents a case study of the rotating cylinder treatment system (RCTS™), an innovative system designed to address issues associated with conventional lime treatment of mining-influenced water. An RCTS system and a sedimentation basin were constructed at Elizabeth Mine to treat high concentrations of iron originating from the base of the combined tailings pile. From May 2009 to November 2017, the system treated concentrations of 50-1,700 mg/L iron annually. The system effectively removed iron, with generally less than 1 mg/L found in the effluent from the sedimentation basin. https://cfpub.epa.gov/csl/public_file_download.cfm?download_id=53067281&ab=CFC584

SERPENTINE-REACHED MINING WASTES AS A GEOCHEMICAL BARRIER FOR THE SOIL REMEDIATION UNDER THE ONGOING CU-NI POLLUTION IN THE RUSSIAN ARCTIC

Sukovskaya, M., I. Kremetskaya, S. Drogozbuzhskaya, L. Ivanova, A. Novikov, and I. Mosendz.
European Geosciences Union General Assembly, 4-8 May, Virtual, 21 slides, 2020

A study was conducted at two sites in the Kola peninsula using three types of serpentine mining wastes, expanded vermiculite, and a grass seed mixture in the impact zone of a copper-nickel ore processing enterprise. Site soil included podzol and peat soil. For the first 5-8 years of the experiment, the Technosol upper layers primarily consisted of serpentine minerals. Over 1 g/kg Ni and 0.1 g/kg Cu accumulated due to their continuous deposition from the atmosphere. Grass growth and litter deposition (4.5-6 kg/m²) during the experimental term led to the accumulation of organic carbon by serpentine minerals. Results indicated that the use of serpentine-rich mining wastes bound metals emitted by the smelter into insoluble forms reduced the toxicity of water-soluble and exchangeable fractions of heavy metals and promoted the sustainable development of the plant cover. https://presentation-conference.eu/EGU2020/EGU2020-546_presentation.pdf

ECO-SUSTAINABLE PASSIVE TREATMENT FOR MINE WATERS: FULL-SCALE AND LONG-TERM DEMONSTRATION

Orden, S., F. Macías, C. R. Canovas, J.M. Nieto, R. Perez-Lopez, and C. Ayora.
Journal of Environmental Management 280:111699(2021)

The technical and economic performance of a full-scale passive Disperse Alkaline Substrate (DAS) treatment plant was evaluated after continuous treatment of acidic and metal-rich mine waters in the Iberian Pyrite Belt over 28 months (840 days). The system treated about 56,000 m³ of mining-influenced water without significant clogging or exhaustion of the alkaline substrate. The system significantly decreased the average net acidity to ~43 mg/L as CaCO₃ equivalent and eliminated Al, Cu, REY, Zn, As, Cr, Mo, V, Cd, Pb, Co, and other trace metals in the water. Water quality of the treated output discharge met the threshold values for irrigation and drinking standards, except for Fe, Mn, and sulfate. The accumulation of elements of economic interest in the waste (e.g., 32 t of Fe, 6.1 t of Al, 0.8 t of Cu, 0.8 t of Zn, 39.4 kg of REE, 20 kg of Co or 1 kg of Sc), which are easily extractable with diluted acids, may turn hazardous waste into a valuable resource. The economic benefits associated with the revalorization of this metal-rich waste are also presented. Results suggest that the DAS technology is a technically and economically sustainable method for decontaminating acid and metal-rich mine waters in abandoned mines.

USING SPENT BREWERY GRAIN TO SUPPRESS ACID ROCK DRAINAGE FROM HISTORIC TAILINGS

Gusek, J., T. Corcutt, and L. Josselyn. | San Juan Mining & Reclamation Conference, 21-23, virtual, 15 minutes, 2020

This presentation reports the most recent results of a kinetic cell test (KCT) program and discusses the Beer2Clear® Initiative to mitigate the surface water quality impacts associated with acid rock drainage (ARD). The KCT program aimed to determine the proper ratio of spent brewery grain (SBG) to mill tailings, assess the potential benefits of adding other ARD-inhibiting amendments, and gauge field success of application methods as part of an effort to revegetate the pyritic Atlas mill tailings and mitigate runoff. Twenty KCTs were constructed in January 2020 at an offsite location to facilitate sampling during the winter months. Preliminary monitoring results indicated that the KCTs that received SBG generated leachates with pH near or above 8.0, while the two control KCTs produced leachate with pH ranging from 4.5 pH (un-vegetated) to 6.1 (vegetated). The SBG-amended KCTs also out-performed other cells that received alternative proven ARD-inhibiting materials and lime. <https://www.youtube.com/watch?v=6L6NtrEjS8k&list=PL6A4wK7LzCnR3M7W4W4Btgm1Y5tmdg35>

Research

MINE RECLAMATION ENHANCES HABITATS FOR WILD UNGULATES IN WEST-CENTRAL ALBERTA

Beale, M.M. and M.S. Boyce.
Restoration Ecology 28(4):828-840(2020)

Data on the abundance and distribution of sympatric bighorn sheep (*Ovis canadensis*), elk (*Cervus elaphus*), and mule deer (*Odocoileus hemionus*) was obtained from 2004 to 2017 using direct ground counts in 200 × 200 m grid cells. Landscape and topographic features were assigned to the grid cells to represent changes due to mining and reclamation. The use of reclaimed features and landscapes by bighorn sheep, elk, and mule deer increased access to quality forage and decreased predation risk. Sheep and elk also often selected areas near haul roads. <https://onlinelibrary.wiley.com/doi/pdf/10.1111/rec.13137>

BIOACCUMULATION OF HG IN RICE LEAF FACILITATES SELENIUM BIOACCUMULATION IN RICE (*ORYZA SATIVA* L.) LEAF IN THE WANSHAN MERCURY MINE

Chang, C., C. Chen, R. Yin, Y. Shen, K. Mao, Z. Yang, X. Feng, and H. Zhang
Environmental Science & Technology 54(6):3228-3236(2020)

A field study and a controlled study at a mercury mine in southwest China were conducted to investigate the bioaccumulation of Hg and Se in the rice-soil system. In the field study, a positive correlation between Hg concentrations and bioaccumulation factors (BAFs) of Se in rice leaves was observed ($r^2 = 0.60$, $p < 0.01$). These results suggested that the bioaccumulation of atmospheric Hg in rice leaves can facilitate the uptake of soil Se, potentially through the formation of an Hg-Se complex in rice leaves. This conclusion was supported by the controlled study, in which significantly higher concentrations and BAFs of Se in rice leaf were observed at a site with high atmospheric Hg, compared to another site with low atmospheric Hg.

CONTRIBUTION OF PRECIPITATION AND ADSORPTION ON STABILIZATION OF PB IN MINE WASTE BY BASIC OXYGEN FURNACE SLAG AND THE STABILITY OF PB UNDER REDUCTIVE CONDITION

Kim, S.H., S. Jeong, H. Chung, and K. Nam.
Chemosphere 263:128337(2021)

Basic oxygen furnace slag was used to stabilize Pb in mine waste, with Stabilization efficiencies varied from 52.2 to 98.0% depending on slag and water content. Both slag and water content positively affected stabilization efficiency. X-ray photoelectron spectroscopy suggested that precipitation and adsorption mechanisms were involved. An increase in the slag content mainly increased adsorption, likely due to an increase in the adsorption sites. Increasing water content, on the other hand, facilitated precipitation by lowering the ionic strength. Sequential extraction results demonstrated that the adsorbed Pb became mobilized, and the fraction of exchangeable Pb increased at a redox potential of 20-85 mV.

REMEDIATION OF METAL CONTAMINATED SIMULATED ACID MINE DRAINAGE USING A LAB SCALE SPENT MUSHROOM SUBSTRATE WETLAND

Siobhan, N.J., W. Reddington, and B.H. Laura
Journal of Environmental Waste Management and Recycling 4(1)(2021)

An innovative pilot-scale spent mushroom substrate wetland was evaluated for the attenuation of simulated acid mine drainage (SAMD) similar in composition to wastewater from the Irish mining region in Avoca, Co. Wicklow. The small-scale surface flow wetland, consisting of four cells in triplicate, received ~4.32 L/day of SAMD. Over 800 days, average removal efficiencies of Al (99%), Zn (99%), Cu (99%), Fe (97%), and Pb (97%) were recorded, with no removal noted for Mn. These high removal rates were found to be comparable with or higher than other published results. Despite the reduction in pH and alkalinity throughout the trial, the rise in sulfate concentrations and the production of ammonia within the system were of concern. Temperature was also found to have an effect, with poor removal rates recorded at low-temperature events (<1°C). The system could be further expanded to include other passive treatment technologies to increase longevity.

ABILITY OF CISTUS SALVIFOLIUS L. TO PHYTOSTABILIZE GOSSAN MINE WASTES AMENDED WITH ASH AND ORGANIC RESIDUES

Carvalho, L.C., E. Santos, J.A. Saraiva, and M.M. Abreu.
European Geosciences Union General Assembly, 4-8 May, Virtual, 10 slides, 2020

This study examined the phytostabilization of acidic gossan mine wastes from a Sao Domingos mine using *Cistus salvifolius* amended with organic/inorganic wastes. The amendments included biomass ash (BA, 2.5 g/kg of gossan), a mixture of organic residues (OR, 120 g/kg of gossan), and a mixture of BA and OR. The best vegetative development that occurred without visible signs of toxicity was obtained in the treatments with OR or BA+OR. Independent of the treatment, *C. salvifolius* did not accumulate potentially harmful elements. High levels of catalase activity were quantified in the soluble fraction of the roots in the OR treatment and in the ionically bound fraction of roots in BA+OR treatment. The activity of peroxidase quantified in the soluble fraction was slightly higher in roots than in shoots, while in the ionically bound fraction, high values were measured both in shoots and roots. The application of amendments, especially with organic matter, together with the phytostabilization yields better overall chemical characteristics of mine wastes, such as a decrease in most potentially harmful elements in the available fraction and an increase of soil fertility and water-holding capacity. https://presentations.eurochemics.org/EGU2020/EGU2020-18789_presentation.pdf

NOVEL TWO-STAGE BIOCHEMICAL PROCESS FOR HYBRID PASSIVE/ACTIVE TREATMENT OF MINE-INFLUENCED WATER

Lundquist, L., Master's thesis, University of British Columbia, 106 pp, 2020

The study developed and tested a novel hybrid passive/active treatment system to remove metals from sulfate-containing mining-influenced water. Laboratory-scale experiments validated the proposed design, which decouples the metal removal and biological sulfate reduction steps into two stages and uses a liquid carbon source. Following the proof-of-concept experiments, a continuous flow experiment was designed and implemented on a field scale at a mining site. Three different column systems were set up using a hay and wood chip mix leachate, molasses, and a control. All three systems were tested for a duration of 96 days. Results indicated that both tested liquid carbon sources could remove over 73% of sulfate and precipitate over 85% of Zn, Cd, and Pb. These results will inform further pilot testing at the mining site. <https://open.library.ubc.ca/collections/ubtheses/24/item/1.03592841>

FORMATION AND PREVENTION OF PIPE SCALE FROM ACID MINE DRAINAGE AT IRON MOUNTAIN AND LEVIATHAN MINES, CALIFORNIA, USA

Campbell, K.M., C.N. Alpers, and D.K. Nordstrom.
Applied Geochemistry 115:104521(2020)

Samples of scale and acid mine drainage (AMD) were collected from the pipelines to treatment plants at Iron Mountain Mine (IMM) and Leviathan Mine (LM) pipelines for mineralogical, microbiological, and chemical analysis. The scale mineralogy was primarily schwertmannite with minor amounts of poorly crystalline goethite. Although the bulk composition of the scale was similar along the length of the pipeline at IMM, the number of iron-oxidizing bacteria and concentrations of associated trace elements decreased along the flow path inside the pipeline. Laboratory batch experiments with unfiltered AMD from IMM and LM showed that Fe(II) oxidation was driven by microbial activity when the pH was <5. A remediation strategy of decreasing the pH to <2.2 was tested through geochemical modeling and laboratory experiments. These experiments indicated that scale formation could be prevented by decreasing the pH, which could be achieved at IMM by mixing source waters. However, the presence of Fe(III)-rich scale in a pipeline buffers the pH to higher values that may affect efficiency.

THE ROLE OF NANOSCALE AGGREGATION OF FERRIHYDRITE AND AMORPHOUS SILICA IN THE NATURAL ATTENUATION OF CONTAMINANT METALS AT MILL TAILINGS SITES

Kawamoto, K., H. Yokoo, A. Ochiai, Y. Nakano, A. Takekida, T. Oki, M. Takehara, M. Uehara, K. Fukuyama, Y. Ohara, T. Ohnuki, M.F. Hochella Jr., and S. Utsunomiya.
Geochimica et Cosmochimica Acta [Published online 10 February 2021, prior to print]

Mine tailings from the Ningyo-toge uranium deposit in Japan were investigated using traditional solution and mass spectroscopy, as well as synchrotron-based methods. Past mining activities at the site resulted in slightly acidic mine drainage and the contamination of a mill tailings pond with U, As, and Ra. The geochemistry of water, colloids, and sediments from the groundwater downgradient of the mill tailings pond was investigated. The investigation suggested that during sedimentation, associations of amorphous silica within the aggregate play a key role in retaining ferrihydrite structure that adsorbs toxic elements such as As. Consequently, the mechanism of natural attenuation at the nanoscale, constrained by the chemical and physical properties of ferrihydrite-amorphous silica aggregates, may be of critical importance in mill tailings and other mine drainage sites due to the ubiquitous and dominant occurrence of both Si and Fe.

General News

BEST PRACTICES TO PREVENT RELEASES FROM IMPOUNDMENTS AT ABANDONED MINE SITES WHILE CONDUCTING CERCLA RESPONSE ACTIONS

EPA Office of Land and Emergency Management, Directive No. 9285.2-14, 64 pp, 2020

This document describes best practices and approaches to reduce the threat of, or prevent, a proposed CERCLA activity from causing a breach or failure of impoundments at abandoned mine sites. These best practices are based predominantly on current U.S. federal and state practices and standards for the management of operating impoundments. The best practices in this document and in other documents referenced are intended to serve as technical resources for EPA working on CERCLA sites with abandoned mine impoundments. <https://semspub.epa.gov/wod/HQ/10002586.pdf>

INTERACTIVE PHREEQ-N-AMDTREAT WATER-QUALITY MODELING TOOLS TO EVALUATE PERFORMANCE AND DESIGN OF TREATMENT SYSTEMS FOR ACID MINE DRAINAGE

Cravotta, C.A. | Applied Geochemistry 126:104845(2021)

This article describes PHREEQ-N-AMDTreat aqueous geochemical modeling tools, which simulate pH and solute concentration changes that result from passive and active treatment of acidic or alkaline mine drainage (AMD). The interactive tools are publicly available and user-friendly. The software is available for download at <https://code.usgs.gov/water/phreeq-n-amdtreat>.

ACTIVE TREATMENT OF CONTAMINANTS OF EMERGING CONCERN IN COLD MINE WATER USING ADVANCED OXIDATION AND MEMBRANE-RELATED PROCESSES: A REVIEW

Ryskie, S., C.M. Neculita, E. Rosa, L. Coudert, and P. Couture.
Minerals 11(3):259(2021)

This paper reviews recent research on the challenges and opportunities related to contaminants of emerging concern in mine water treatment and focuses on advanced oxidation and membrane-based processes on mine sites operating in cold climates. The paper identifies research needs in mine water treatment. This article is **Open Access** at <https://www.mdpi.com/2075-163X/11/3/259>.

HARD ROCK MINE RECLAMATION: FROM PREDICTION TO MANAGEMENT OF ACID MINE DRAINAGE

Bussiere, B. and M. Guittony (eds.). CRC Press, ISBN 9781138054516, 408 pp, 2020

This book focuses on the reclamation of waste storage areas as the main source of pollution during and after mine operations. It also details issues with acid mine drainage and neutral contaminated drainage.

BEYOND REMEDIATION: CONTAINING, CONFRONTING AND CARING FOR THE GIANT MINE MONSTER

Beckett, C. | Environment and Planning E: Nature and Space [Published online 1 September prior to print]

Using the Giant Mine in Yellowknife as a case study, this article presents the story of the Giant Mine 'Monster' how it was defined, how it has changed, and how nearby communities will care for the mine in the future. Literature reviews, archival analysis, key informant interviews, and participant observation were combined to analyze the multiple experiences, practices, and stories of the Giant Mine Remediation Project. By focusing on the technical containment of arsenic trioxide pollution, the Giant Mine Remediation Project sidelined community objectives for compensation, independent oversight, and a perpetual care plan. However, through the ongoing activism of the Yellowknives Dene First Nations and community allies, the Giant Mine Monster is being creatively reframed as something to care for and live with for generations to come. The Giant Mine case points to a critical reconceptualization of environmental remediation as an anti-colonial mechanism to (re)structure, or (re)mediate, relationships with both land and people. Without a community objectives-based approach to remediation, such projects risk continuing systems of colonization, marginalization, and environmental injustice.

REVIEW OF THE GLOBAL EXPERIENCE IN RECLAMATION OF DISTURBED LANDS

Tymchuk, I., M. Malovanyy, O. Shkivirko, N. Chornomaz, O. Popovych, R. Grechanik, and D. Symak.
Ecological Engineering & Environmental Technology 22(1):24-30(2021)

The article addresses the global experience of reclaiming land disturbed by mining and man-made processes. It analyzes the Ukraine's experience in carrying out biological reclamation of disturbed lands as a result of mining operations, defines the directions of land reclamation in the world, and discusses which plant species are best used for biological reclamation of disturbed lands.

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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