

Technology Innovation News Survey

Entries for November 16-30, 2023

Market/Commercialization Information

B -- ENVIRONMENTAL SITE ASSESSMENTS (ESA) AND HAZARDOUS MATERIALS AND ASBESTOS SURVEY (HMAS) REPORTS AT THE WINNEBAGO, NEBRASKA CAMPUS FOR THE GREAT PLAINS AREA IHS OEHE (SOL)

U.S. Department of Health and Human Services, Indian Health Service, Great Plains Area, Aberdeen, SD
Contract Opportunities on SAM.gov 75H70624Q00005, 2023

This is a Buy Indian set-aside (specific to Department of Health and Human Services, Indian Health Services) under NAICS code 541620. The Indian Health Service requires a contractor to produce Phase 1 Environmental Site Assessment (ESA) and Hazardous Materials and Asbestos Survey (HMAS) reports for the Winnebago Campus in Winnebago, Nebraska. Hazardous materials shall include asbestos, lead-based paint (LBP), mold, mercury-containing materials, polychlorinated biphenyls (PCBs), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), oil and oil products (including treated timbers), household hazardous waste (paints, varnishes, solvents, and cleaning chemicals), fuel oil tanks, miscellaneous hazardous materials, solid waste, and radon. The purpose of these assessments and surveys is to gather sufficient information to develop an independent professional opinion about the environmental condition of the property and to identify actual or potential environmental contamination. The contractor shall provide certified inspector/s to perform the Phase 1 ESA per ASTM E1527-21. A hazardous material and asbestos building and site survey shall also be provided for the buildings. Offers are due by 5:00 PM CST on January 25, 2024. <https://sam.gov/opp/d7432af6df8a9fr8bda2a987b6aa60/view>

F -- FORMAL SOLICITATION AND REQUEST FOR PROPOSALS (RFP) FOR ERRS VI: EMERGENCY RESPONSE AND REMOVAL SERVICES (SOL)

U.S. Environmental Protection Agency, Region 9 Contracting Office, San Francisco, CA
Contract Opportunities on SAM.gov 68HE0923R0006, 2023

This is a total small business set-aside under NAICS code 562910. EPA Region 9 seeks a contractor to provide rapid and responsive environmental cleanup services for releases of hazardous substances, wastes, pollutants and contaminant materials, and oil and petroleum products for EPA Region 9. Environmental cleanup in response to natural and manmade disasters, terrorist activities, weapons of mass destruction, and nuclear, biological, or chemical incidents may also be required under this contract. A regional "cross-over", a response in another EPA region, may be requested under this contract. It is also anticipated that, under rare circumstances, international and transboundary responses may be required. Contractor personnel require specialized training in National Incident Management System (NIMS) and Incident Command System (ICS) tenets. To comply with the NIMS requirements, non-government first responder personnel and disaster workers must take NIMS, NRP, and ICS training. The process for award will be a two-step advisory down-selected process with a basic technical offer due first for review as to whether the competitor will be a viable contender for award. Basic technical offers are due by 4:00 PM PST on January 25, 2024. <https://sam.gov/opp/3f55bc10f833474c811e5f1fa81710c1/view>

F -- SITE WALK REMEDIATION SERVICES AT OTTAWA RADIATION (SOL)

U.S. Environmental Protection Agency, Region 5 Contracting Office, Chicago, IL
Contract Opportunities on SAM.gov 68HE0523R0050, 2023

This is a total hubzone business set-aside under NAICS code 562910. EPA Region 5 seeks a contractor to complete the remediation of the Ottawa Radiation Areas National Priorities List (NPL)-8 Site, utilizing the 2007 Remedial Design, with updated site condition information found in the supplemental design investigation, remedial action report for the Frontage Property, 2020 and 2021 Auto Dealership Investigation Reports. The NPL-8 site consists of four parcels of land that include both the Frontage Property (one parcel - 4 acres), the Landfill (two parcels, 17 acres), and portions of an adjacent auto dealership property (one parcel). Access to NPL-8 is via the Frontage property, located at 1820 East Norris Drive in Ottawa, Illinois. Please note East Norris Drive is also known as US Route 6 and SR-71. The period of performance for the contract is four years from the date of award. Actual field work is anticipated to last no more than three field seasons. It is anticipated that six (6) months are needed prior to fieldwork for planning, generation, and approval of site plans, and mobilization; another six months are anticipated after fieldwork for completing remedial action reporting and invoicing. Offers are due by 4:00 PM CDT on January 31, 2024. <https://sam.gov/opp/641087cfc3f34ed9a23d89e1d9513095/view>

F -- CORNELL-DUBILIER SUPERFUND SITE OUA4 - REACHES 2-4 - REMEDIAL ACTION (SOL)

U.S. Army Corps of Engineers, Northwestern Division, Kansas City, MO
Contract Opportunities on SAM.gov W912DQ24R3000, 2023

This is a full and open competition under NAICS code 562910. The U.S. Army Corps of Engineers requires a contractor to perform remedial action efforts at Operable Unit 4 (OU4), Reaches 2-4, of the Former Cornell-Dubilier Electronics Superfund Site in Plainfield, New Jersey. The magnitude of construction is estimated between \$250M and \$500M. A site visit is planned for December 12, 2023, at 10:00 AM EST at Veterans Memorial Park, 327 Elm Street in South Plainfield, New Jersey. The Government contemplates the award of a Cost-Plus-Fixed-Fee contract resulting from this solicitation. Offers are due by 12:00 PM EST on January 29, 2024. <https://sam.gov/opp/38f77cfd44544f19baac27b6daad8e8e/view>

Cleanup News

REMEDIAL ACTION EFFECTIVENESS AT THE BUNKER HILL SUPERFUND SITE

Johnson, C. and A. Hughes. | American Society of Reclamation Sciences Conference, 5-7 June, Boise, ID, 15 slides, 2023

The Coeur d'Alene Trust recently assisted EPA in updating the Basin Environmental Monitoring Plan (BEMP) approach that defines how remedial action (RA) effectiveness monitoring should be conducted at the Bunker Hill Mining and Metallurgical Superfund site in northern Idaho. Bunker Hill encompasses the Upper and Lower Basins of the Coeur d'Alene River, Coeur d'Alene Lake, and a portion of the Spokane River. Metal-laden waste originating from historic mine and mill sites in the Upper Basin migrated into soil, groundwater, surface water, and sediment throughout the site. As part of the RAs, the Coeur d'Alene Trust conducts monitoring to evaluate effectiveness in relation to the goals and objectives of the project consistent with the BEMP, which includes baseline and port RA monitoring. Due to the size and complexity of the site, the RA effectiveness monitoring has been divided into site-wide, area-wide, and site-specific geographically-based tiers. Site-wide RA effectiveness monitoring is geographically the largest tier and focuses on the entire site. The area-wide tier encompasses multiple RA sites and surrounding areas (e.g., within watersheds). Site-specific is the smallest tier and focuses on the goals and objectives of an individual RA. The presentation includes case studies that show how RA effectiveness was determined. <https://papers.asrc.us/wp-content/uploads/2023/08/Remedial-Action-Effectiveness-at-the-Bunker-Hill-Superfund-Site.pdf>

DESIGN AND REGULATORY APPROVAL OF A NOVEL IN-SITU SALT CAP FOR FINAL CLOSURE OF CONTAMINATED WASTEWATER PONDS AT A BRINE MINING OPERATION

Lundmark, K., D. Abranovic, and A. Kafle. | Proceedings of the 16th International Conference on Mine Closure, 2-5 October, Reno, NV, 2023

A novel cap closure technology was developed to close a series of large (over 4 sq km) earthen evaporation ponds at a brine mining operation adjacent to the Great Salt Lake in Utah. The cap design included in situ precipitation of a salt cap (primarily NaCl) to prevent contact between humans and wildlife with contaminated sediments and mine wastes contained in the facility's wastewater evaporation ponds. The nature-based salt cap is designed to mimic naturally occurring salt beds present regionally in the Great Basin and is preferable over traditional closure approaches because 1) saturated wastes and sediments in the ponds are not suitable for traditional earthwork equipment operation; 2) long haul distances for waste disposal or importing cap materials; and 3) the size of the wastewater evaporation ponds and large volume of wastes/sediments. Salt cap design parameters, including annual salt deposition rates (in cm), brine requirements, and salt weathering rates were estimated through a multi-year field-scale pilot test at a salt accumulation test cell constructed within the footprint of one of the wastewater evaporation ponds. Pilot testing also evaluated the effects of brine sources on salt deposition rates, where brine was obtained either from Great Salt Lake or from solar evaporation ponds brine feedstock for the mining operations. Key technical challenges addressed during salt cap design included the construction of interior partitions, irregular/sloping beds, and groundwater discharge areas within the wastewater evaporation ponds, expected timeframe for construction, and potential for contaminant leaching upward into the salt cap. EPA approved the salt cap closure as the approach for final closure of the wastewater evaporation ponds under both Superfund and RCRA programs. This technology also uses sustainability best management practices to limit the use of natural resources and energy, reduce negative environmental impacts, and minimize or eliminate greenhouse gases to the greatest extent possible. https://papers.acg.uwa.edu.au/d/2315_030_Lundmark/030_Lundmark.pdf

CONVERSION OF AN EVAPOTRANSPIRATION SOIL COVER TO A GEOSYNTHETIC COVER FOR A WASTE ROCK FACILITY CLOSURE

Yuan, P.H., G. Zhan, A. Jones, and R. Hufford. | Proceedings of the 16th International Conference on Mine Closure, 2-5 October, Reno, NV, 2023

This article presents a case study, where parts of an existing evapotranspiration (ET) cover were replaced with a geomembrane overlain by a geocomposite drainage material to achieve low percolation rates at the Rain Mine in northern Idaho. The ET cover was constructed in 2002 on a waste rock facility (WRF). 2,020 m above mean sea level where annual precipitation, primarily snow, is estimated at 442 mm. Mature vegetation was established by 2011. Estimated percolation through the WRF was ~12% of annual average precipitation (2011-2019). The high percolation rate occurs because accumulated snow is difficult to manage with an ET cover in a snowmelt hydrology setting. Existing ET cover soils were salvaged and placed on the geosynthetic cover. The geosynthetic cover system was constructed on the part of the WRF that receives most wind-drifted snowfall deposits. The case study summarizes a performance evaluation of the ET soil cover, characterization data collected, and geotechnical analyses performed to support the new cover design. Construction experience learned from the execution of the project and performance data of the new cover system collected to date are also presented. Preliminary results indicate that the seepage rate from the WRF was significantly reduced after installation of the new cover. https://papers.acg.uwa.edu.au/d/2315_031_Yuan/031_Yuan.pdf

Demonstrations / Feasibility Studies

DEMONSTRATION OF SCALED-PRODUCTION OF RARE EARTH OXIDES AND CRITICAL MATERIALS FROM U. S. COAL-BASED SOURCES

Honaker, R.Q. J. Werner, A. Nawab, W. Zhang, A. Noble, M. Free, and X. Yang.
USDOE Office of Fossil Energy (FE), Clean Coal and Carbon Management, Report No. DOE-UKY-3182, 1089 pp, 2023

A project aimed to demonstrate scaled high-purity rare earth oxide (REO) production, nominally >90% grade, from coal refuse sources using innovative technologies that reduce cost and improve environmental outcomes relative to traditional rare earth processing technologies. The project utilized a critical material pilot plant constructed and tested in a previous project. Target performance criteria were a 50% reduction in production cost based on previous optimum values, a 150% increase in recovery, and >2% REOs, Co, and Mn concentrates. Concentrate production goals were to produce an REO mix product at a 200 g/d rate with a 50% minimum purity and Co and Mn products with a minimum purity of 2%. Reducing acid cost was a major target using bio-oxidation reactors to produce sulfuric acid from naturally occurring coal pyrite. Pilot-scale bio-oxidation experiments achieved comparable rare earth element leaching recoveries to the conventional sulfuric acid leaching. Elevated Fe concentration in the solution caused rare earth element (REE) co-precipitation with the Fe and Al cations, resulting in REE losses. Elevated Fe content bypassing the Fe and Al precipitation stages contaminated the metal sulfide and Mn cake. A techno-economic analysis was performed using a commercial facility that treated 500 tph of coal-based material. The production cost for West Kentucky No. 13 coarse refuse material ranged from ~\$500-\$700/kg of total REOs, whereas the lignite source had a significantly lower production cost of \$100-\$300/kg. The significant cost difference was due to the easier lignite material leaching characteristics and higher feed concentrations. All process scenarios resulted in a negative net present value (NPV). Lab REE leach recovery values were ~30% higher than the pilot plant data for the lignite feedstock. A positive NPV was achieved using lab leach results, and production cost decreased from \$100-\$300 /kg to <\$150/kg of total REO. <https://www.osti.gov/servlets/purl/1971736>

NMR LOGGING TECHNOLOGIES FOR HIGH-RESOLUTION SITE CHARACTERIZATION AND MONITORING OF ENVIRONMENTAL REMEDIATION

Walsh D. and D. Morozov. | The Remplex Virtual Global Summit, 14-16 November, 27 slides, 2023

This presentation overviews nuclear magnetic resonance (NMR) technology and explores available tools and potential applications in environmental remediation. Results of recent work for the Moab Uranium Mill Tailings Remedial Action is discussed, where unattended borehole NMR technology was used to monitor longitudinal changes in water signal associated with the progress of hydroxyapatite precipitation. <https://www.pnnl.gov/sites/default/files/media/file/NMR%20Technologies%20for%20the%20Environmental%20Remediation%20%28November%2C2023%29.pdf>

COLD DESERT EVAPOTRANSPIRATION COVER SYSTEM DESIGN

Bunting, L., J. Keller, M. Milczarek, C. Jim, and K. Bansah. | Proceedings of the 16th International Conference on Mine Closure, 2-5 October, Reno, NV, 2023

The effectiveness of 0.3 m, 0.9 m, and 1.5 m thick monolayer evapotranspiration (ET) cover systems was evaluated at the Round Mountain Gold Corporation mine in central Nevada to minimize net percolation of precipitation into underlying potential acid-generating waste rock. Each test plot is ~200 m² and includes three cover system performance monitoring stations with sensors placed at ~0.6 m intervals along a vertical profile in the cover and waste rock to 2.4 m max depths. The sensors measure soil matrix potential, temperature, water content, and direct net percolation water flux. Soil water content and matrix potential data were used to evaluate the cover systems' capacity to store infiltrated precipitation and to remove water via ET. Direct net percolation flux measurements were collected below the estimated depth of ET to provide a point estimate of net percolation flux into the waste rock. The site-specific seed mix applied to the test plots did not establish, so vegetation primarily comprises invasive annuals. Annual precipitation from 2012 to 2021 represented long-term average precipitation conditions. Wetting was observed to a max depth of 1.2 m at the 0.3 m and 1.5 m ET plots. The deepest wetting (1.8 m) was observed in the 0.9 m ET plot due to focused run-on at two monitoring stations. Soil profile drying occurred in late spring and early summer at all plots in response to decreased precipitation and increased ET. The average annual net percolation flux over the monitoring period was 0 for the 0.3 and 1.5 m ET cover systems and 0.1% of precipitation for the 0.9 m cover system, most likely due to run-on to the test plot. Results indicate no difference in the effectiveness of 0.3 m, 0.9 m, and 1.5 m ET cover systems in minimizing net percolation of precipitation into underlying waste rock. https://papers.acg.uwa.edu.au/d/2315_033_Bunting/033_Bunting.pdf

SINGLE-WELL PUSH-PULL TRACER TEST ANALYSES TO DETERMINE AQUIFER REACTIVE TRANSPORT PARAMETERS AT A FORMER URANIUM MILL SITE (GRAND JUNCTION, COLORADO)

Johnson, R.H., C.J. Paradis, R.D. Kent, A.D. Tigar, and P.W. Reimus. *I Minerals* 13(2):229(2023)

Prior work at a former U mine determined several potential ongoing secondary U sources, including locations with U sorbed to organic carbon, U in the unsaturated zone, and U associated with gypsum. Four single-well push-pull tests were completed to better understand U mobility controls to develop aquifer flow and contaminant transport parameters for inclusion in a future site-wide reactive transport model to evaluate alternative remedial injection fluids, which can produce variable Kd values. Dispersion was removed from the data to determine possible reactions before conducting reactive transport simulations and indicated a potential need to include cation exchange, U sorption, and gypsum dissolution. A reactive transport model with multiple layers to account for partially penetrating wells quantified the hydraulic conductivity and dispersion parameters using injected tracer concentrations. U sorption, cation exchange, and gypsum dissolution parameters were quantified by comparing the simulated versus observed geochemistry. All simulations required some cation exchange and calcite equilibrium, and one simulation required gypsum dissolution to improve the model fit for calcium and sulfate. The other parameter values did not strongly influence U sorption parameters but were highly influenced by U concentrations during the drift phase, with possible kinetic rate limitations. A recommendation for the push-pull tests is to collect more geochemical data during the drift phase. The final U sorption parameters were within the range of values determined from prior column testing. The flow and transport parameters derived from the tests will provide initial parameters for a future site-wide reactive transport model. <https://www.nsti.gov/services/purl/1957938>

Research

THE EFFECT OF BIOGEOCHEMICAL REDOX OSCILLATIONS ON ARSENIC RELEASE FROM LEGACY MINE TAILINGS

Liu, Y., R.A. Root, N. Abramson, L. Fan, J. Sun, C. Liu, and J. Chorover
Geochimica et Cosmochimica Acta 360:192-206(2023)

A study used a redox-stat reactor to control oscillations between 7 d oxic and 7 d anoxic half-cycles over three months in mine tailings with and without a compost-derived organic matter (OM) solution amendment. Aqueous and solid phase analyses during and after redox oscillations revealed that soluble OM addition stimulated pyrite oxidation, which resulted in accelerated acidification and increased aqueous sulfate activity. Soluble OM in the reactor solution significantly increased As mobilization under anoxic half-cycles primarily through reductive dissolution of ferrihydrite. Microbially-mediated As reduction was also observed in compost treatments, which increased partitioning to the aqueous phase due to the lower As(III) affinity for complexation on ferric surface sites (e.g., ferrihydrite). Oxic half-cycles showed As repartitioned to the solid phase concurrent with ferrihydrite and jarosite precipitation. Multiple redox oscillations increased the Fe mineral crystallinity in the treatment reactors with compost solution due to the reductive dissolution of ferrihydrite and jarosite precipitation. The release of As from tailings gradually decreased after repeated redox oscillations. The high sulfate, ferrous iron, and hydronium activity promoted jarosite precipitation, which sequestered arsenic. Results indicated that redox oscillations under compost-assisted phytostabilization can promote As release that diminishes over time. <https://www.sciencedirect.com/science/article/pii/S001393512300405X/pdf?md5=2c4e1122abfa0ee3571729b52e2394dr&pid=1-s2.0-S001393512300405X-main.pdf>

MECHANISMS OF WATER-ROCK INTERACTION AND IMPLICATIONS FOR REMEDIATING FLOODED MINE WORKINGS ELUCIDATED FROM ENVIRONMENTAL TRACERS, STABLE ISOTOPES, AND RARE EARTH ELEMENTS

Newman, C.P., K. Walton-Day, R.L. Runkel, and R.T. Wilkin.
Applied Geochemistry 157:105769(2023)

A diverse and novel dataset of stable isotopes of water, sulfate, and carbon ($\delta^2\text{H}$, $\delta^{18}\text{O}_{\text{H}_2\text{O}}$, $\delta^{18}\text{O}_{\text{SO}_4}$, $\delta^{34}\text{S}$, $\delta^{13}\text{C}_{\text{DIC}}$), rare earth elements, and environmental tracers (noble gases and tritium) were collected during water impoundment within the mine workings to understand groundwater recharge and mixing, mechanisms of sulfide oxidation and water-rock interaction, and remedial influence on the hydrologic and geochemical system at the Capataz Jack Superfund site, outside of War, Colorado. A pyritic mine adit was remediated by emplacement of a hydraulic bulkhead to preclude acid mine drainage from entering nearby Effingham Creek. Water isotopes indicate that groundwater distal from the mine workings has seasonally variable recharge sources, whereas water within the workings has a distinctive composition with minimal temporal variability. Sulfate isotopes indicate that sulfide oxidation occurs within the mine workings and in adjacent igneous dikes, and sulfide oxidation may occur under suboxic conditions with ferric iron as the oxidant. Carbon isotopes track the neutralization of acidic waters and the carbon mass budget of the system. Rare earth elements corroborate stable isotopes in indicating groundwater compartmentalization and illustrate enhanced mineral weathering in the mine workings. Environmental tracers indicate mixing modern and pre-modern groundwater and inform timelines that active remediation may be needed. Together, these datasets provide a useful template for similar investigations of abandoned mine sites where physical mixing processes, sources of solute loading, or remediation timeframes are important.

MINE LAND RECLAMATION, MINE LAND REUSE, AND VEGETATION COVER CHANGE: AN INTRIGUING CASE STUDY IN DARTFORD, THE UNITED KINGDOM

Yu, H., I. Zahidi, and D. Liang. *Environmental Research* 225:115613(2023)

Several companies collaborated under the guidance of local authorities to reclaim abandoned mine land in Dartford, England, and develop it into housing, known as the Ebsfleet Garden City project. This project is highly innovative as it focuses on environmental management and provides potential economic benefits and employment opportunities, builds a sustainable and interconnected community, fosters urban development, and brings people closer together. The project employs satellite imagery, statistical data, and Fractional Vegetation Cover calculations to analyze the revegetation progress of Dartford and the Ebsfleet Garden City development. Results indicate that Dartford has successfully reclaimed and revegetated the mine land, maintaining a high vegetation cover level while the Ebsfleet Garden City project has advanced.

DESIGNING AMENDMENTS TO IMPROVE PLANT PERFORMANCE FOR MINE TAILINGS REVEGETATION

Johnson, M.G., D.M. Olszyk, T. Shroyama, M.A. Bollman, M.S. Nash, V.A. Manning, K.M. Trippe, D.W. Watts, and J.M. Novak.
Agrosystems, Geosciences & Environment 6(3):e20409(2023)

Two greenhouse experiments were conducted to evaluate the use of remedial amendments to improve the survival and growth of Douglas fir (*Pseudotsuga menziesii*) seedlings and provide recommendations to establish plants on low-pH Formosa Mine tailings. A preliminary experiment indicated that 1% lime (by weight) raised tailings pH, permitting seedling survival. However, high biosolid application rates (BS; 2% by weight) added to supply nutrients were phytotoxic when added with lime. A gasified conifer biochar (BC) added to tailings at 1%, 2.5%, or 5% (by weight), along with lime and BS, caused an additional increase in pH, decreased electrical conductivity (EC), and tended to increase the survival of Douglas fir. The addition of a locally sourced microbial inoculum (LSM) did not affect survival. A subsequent experiment expanded the experimental design by testing multiple levels of amendments, including lime (0.5% and 1% by weight), three application rates (0.2%, 0.5%, and 2%) of two nutrient sources (BS or mineral fertilizer), BC (0% and 2.5%), and with or without LSM. There were many interactions among amendments. Douglas fir survival was generally enhanced when lime and BC were added. The experiments suggest that amending with lime, a nutrient source, and BC would enhance revegetation on low-pH, metal-contaminated mine tailings.

PHYTOREMEDIATION POTENTIAL OF NATIVE PLANT SPECIES IN MINE SOILS POLLUTED BY METAL(LOIDS) AND RARE EARTH ELEMENTS

Azizi, M., A. Faz, R. Zornoza, S. Martinez-Martinez and J.A. Acosta
Plants 2023, 12(6):1219(2023)

A study evaluated the contamination level of 29 metal(loid)s and rare earth elements (REEs) in two natural soils and four native plant species (*Salsola oppositifolia*, *Stipa tenacissima*, *Piptatherum miliaceum*, and *Artemisia herba-alba*) growing in the vicinity of a Pb(Ag)-Zn mine and assessed their phytoextraction and phytostabilization potential. Very high soil contamination was found for Zn, Fe, Al, Pb, Cd, As, Se, and Th, considerable to moderate contamination for Cu, Sb, Cs, Ge, Ni, Cr, and Co, and low contamination for Rb, V, Sr, Sn, Y, Bi and U in the study area, dependent of sampling place. Available fraction of potentially toxic elements (PTEs) and REEs compared to total concentration showed a wide range from 0% for Sn to more than 10% for Pb, Cd, and Mn. Soil properties such as pH, electrical conductivity, and clay content affect the total, available, and water-soluble concentrations of different PTEs and REEs. Results from plant analysis showed that the concentration of PTEs in shoots could be at a toxicity level (Zn, Pb, and Cr), lower than toxic but more than sufficient or natural concentration accepted in plants (Cd, Ni, and Cu) or at an acceptable level (e.g., V, As, Co, and Mn). Accumulation of PTEs and REEs in plants and the translocation from root to shoot varied between plant species and sampling soils. *A. herba-alba* is the least efficient plant in the phytoremediation process; *P. miliaceum* was a good candidate for phytostabilization of Pb, Cd, Cu, V, and As, and *S. oppositifolia* for phytoextraction of Zn, Cd, Mn, and Mo. All plant species except *A. herba-alba* could be potential candidates for phytostabilization of REEs, while none of the plant species has the potential to be used for phytoextraction of REEs. <https://www.mdpi.com/2223-7747/12/6/1219/pdf?version=16728266595>

DEWATERING OF MINE TAILING SLURRIES USING GEOTEXTILE TUBE: CASE HISTORIES

Kiffle, Z.B., S.K. Bhatia, and G.E. Lebster.
International Journal of Geosynthetics and Ground Engineering 9(5)(2023)

This paper discusses four different mine tailing case histories in which geotextile tubes were used to illustrate the importance of small or bench-scale tests. The Jar Test, Rapid Dewatering Test, and Geotextile Dewatering Test were used to estimate the dewatered solid content, type and amount of flocculant, quality of the effluent, and time required for dewatering. The study demonstrates that geotextile tubes can effectively dewater mine tailings with an initial solid concentration as low as 0.5% to achieve a final contained solid as high as 36%.

CLEAN ENERGY TECHNOLOGY APPLICATIONS ON US MINE LAND: TECHNICAL ANALYSIS

Sybyna, E., B. Ollis, F. Omatoamu, E. Piescorovskiy, Y. Polisky, S. DeNeale, A. Ghodeswar, Y. Liu, E. Lara-Curzio, P. Dobson, H. Breunig, C. Oldenburg, E. Gasperikova, S. Borglin, M. Taylor, P. Jordan, T. Kneafsey, Z. Zhang, G. Mosey, W. Hawthorne, A. Walker, and M. Ingram.
Oak Ridge National Laboratory, Report No. ORNL/SPR-2023/2868, 219 pp, 2023

This report reviews the potential of demonstrating and deploying clean energy projects on current and former mine land. A clean energy project refers to a project that demonstrates one or more of the following technologies: solar; microgrids; geothermal; direct air capture; fossil-fueled electricity generation with carbon capture, utilization, and sequestration; energy storage, including pumped storage hydropower and compressed air energy storage; and advanced nuclear technologies. The report discusses the technologies and their potential for creating jobs and generating tax revenue that would directly and indirectly benefit the local economy. Case studies highlighting these applications provide key lessons relating to identifying drivers and barriers to geothermal resource deployment and can be used to create screening tools for identifying the types and locations of mielands most amenable to utilizing geothermal resources; <https://info.ornl.gov/sites/publications/Files/Pub192370.pdf>

General News

ACTIVE TREATMENT OPTIONS FOR ACID MINE DRAINAGE

Loken, R. I 2023 PA Abandoned Mine Reclamation Conference, 24-26 October, Altoona, PA, 36 minutes, 2023

This presentation reviews the various treatment options versus the feed water chemistry, the projected capital costs, and the projected operating costs for each that may be used as guidelines to evaluate acid mine or acid rock drainage. The treatment of acid mine drainage via active treatment solutions depends on drainage flow rates and the chemistry and projected life cycle cost at a given site. The various treatment options have advantages and disadvantages that depend primarily on the flow rates and feed water chemistry. New and improved technologies may provide better treatment solutions with lower operating costs versus traditional lime

softening. <https://www.youtube.com/watch?v=w6nj1Y2y1fg>

AMDTREAT 6.0 OVERVIEW

Ream, J. | 2023 PA Abandoned Mine Reclamation Conference, 24-26 October, Altoona, PA, 39 minutes, 2023

This presentation provides a background, history, and purpose of the original AMDTreat program, a tool originally developed in the early 2000s to assist users in the process of estimating the long-term costs of the abatement of mine drainage discharge. The presentation covers why the program needed to be upgraded, describes the tasks and processes that were followed, and provides a virtual demonstration of the beta version. The new version of AMDTreat was developed cooperatively by OSMRE, the Pennsylvania Department of Environmental Protection, the West Virginia Department of Environmental Protection, and the U.S. Geological Service. The program is being coded in C#, which will result in a greater likelihood of continued support by Microsoft. New treatment technologies and analytical tools are also being included to improve the accuracy of cost estimates produced by the software. https://www.youtube.com/watch?v=Th0COTjDm_E
The AMDTreat beta version is available at <https://www.osmre.gov/programs/reclaiming-abandoned-mine-lands/amdtreat>

DATA COLLECTION AND INTERPRETATION FOR SUCCESSFUL AMD TREATMENT PROJECT

Denholm, C. | 2023 PA Abandoned Mine Reclamation Conference, 24-26 October, Altoona, PA, 34 minutes, 2023

This presentation is intended to help watershed groups, nonprofits, and conservation districts understand the collection and interpretation of water quality and flow data so that they can be a valuable partner, not just for the design of the treatment system, but also for long-term monitoring and maintenance that is critical for the treatment system to meet their design life. Topics covered include a basic overview of what water quality parameters need to be measured, how to collect the data, why it is important, and how to interpret the results. <https://www.youtube.com/watch?v=BiNi6LnBO7g>

USA REGULATIONS AND STATE OF PRACTICE FOR THE CLOSURE OF TAILINGS DAMS—AN UPDATE

Crouse, P., M. Abshire, and R. Snow. | Proceedings of the 16th International Conference on Mine Closure, 2-5 October, Reno, NV, 2023

This paper provides an update on the development of guidelines for state regulatory programs and the U.S. mining industry for the closure of a tailings storage facility. In 2022, the U.S. Society on Dams (USSD's) published a white paper describing the misalignment and inconsistency between industry practice and regulations for tailings storage facility closure at legacy and new mine sites in the U.S. Since publication, the U.S. has made progress in educating and informing the mining community on the safe transition of a tailings dam from operation to closure in a sustainable and environmentally responsible manner while considering its potential as a benefit to the community. The Association of State Dam Safety Officials Tailings Dam Regulatory Committee and FEMA are finalizing an update to the Model State Dam Safety Program that includes a Tailings Dam Supplement that will begin to fill the gap in the National Dam Safety Program publication relative to tailings dams. This Tailings Dam Supplement will address planning, risk management, design, construction, operation, and closure for consideration in the regulation of tailings dams. The USSD is developing technical guidelines for tailings dams, including closure that considers transition through the closure process and potential measures to meet long-term dam safety deregulation. Education and certification programs are now available through a network of industry and collaborating universities for the safe operation and closure of tailings dams. An update on these and other guidelines that states can use to become aligned with the leading practice for tailings storage facility closure is also provided. https://papers.acg.uwa.edu.au/d/2315_001_Crouse/001_Crouse.pdf

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