Entries for May 16-31, 2025

Market/Commercialization Information

REMEDIAL ACTION AT ROEBLING STEEL SUPERFUND SITE (PRESOL)
U.S. Army Corps of Engineers, Northwestern Division, Kansas City District, Kansas City, MO
Contract Opportunities on SAM.gov W912DQ25RA038, 2025

When this solicitation is released on or about June 27, 2025, it will be competed as a full and open competition under NAICS code 562910. The U.S. Army Corps of Engineers, Northwestern Division, plans to issue a solicitation for remedial action efforts at the Roebling Steel Superfund Site Operable Units 4 (OU4) and 5 (OU5), located in the Village of Roebling in New Jersey. Remedial activities may include, but are not limited to, installation of a soil cap, building demolition, artifact restoration, building restoration, and construction of a new building. There is no solicitation at this time. https://sam.gov/opp/d3ff9a6bc90b4477913de18025b030c/view

BULK FUELS FACILITY (BFF) GROUNDWATER TREATMENT SYSTEM OPERATIONS, KIRTLAND AIR FORCE BASE, NM (SOL)
U.S. Army Corps of Engineers, South Pacific Engineer Division, Albuquerque District, Albuquerque, NM
Contract Opportunities on SAM.gov W912PP25RA001, 2025

This is a total small business set-aside under NAICS code 562910. The U.S. Army Corps of Engineers, Albuquerque District, seeks a contractor to support activities for addressing groundwater contamination resulting from historical releases of the Bulk Fuels Facility (BFF) at Kirtland AFB (KAFB). The tasks required to achieve the project objectives are the following: maintain and operate the existing BFF Groundwater Treatment System (GWTS) in accordance with regulatory permits and approved Operation and Maintenance (O&M) Plan and other monitoring work plans; monitor groundwater, drinking water, GWTS, soil vapor, and associated media to assess plume conditions, assess safety of drinking water supplies, and assess corrective measures; optimize, improve, and modify the GWTS to adjust to changes in plume extent and to ensure safety of public and KAFB water supply; optimize, improve, and modify groundwater interim measure in order provide data for final corrective measures designs; and coordinate with the Government and other contractors to provide the Government information necessary to perform planning and to brief stakeholders and regulators. The award will be a firm-fixed price contract with a 12-month Base Period and four 12-month Option Periods. Offers are due by 2:00 PM MDT on July 9, 2025. https://sam.gov/opp/a18acbfc8c604ee287bd83c15dd68bdc/view

REMEDIATION AND RESTORATION SERVICES (SOL)
U.S. Department of the Army, Mission, and Installation Contracting Command, 419th CSB, Fort Campbell, KY
Contract Opportunities on SAM.gov W9124825BA001, 2025

This is a service-disabled veteran-owned small business (SDVOSB) set-aside under NAICS code 562910. The U.S. Department of the Army requires a contractor to provide remediation, restoration, and damage mitigation services at Fort Campbell, Kentucky, which has approximately 1,173 buildings and about 15.7 million square feet of space to maintain. Services include, but are not limited to, fire and smoke remediation, water mitigation and remediation, odor removal, biohazard and sewage clean-up, board-up and tarping (storm damage), mold remediation, decontamination, and disinfection, heating ventilation and air conditioning (HVAC) duct cleaning, restoration incidental to remediation, asbestos-containing material (ACM) mitigation and removal incidental to remediation and remediation. The award will be a firm-fixed-price contract with a five-year performance period. Offers are due by 8:00 AM CDT on July 18, 2025. https://sam.gov/opp/de64600afcdf44ca8317b383c59fd958/view

R7 CHEROKEE COUNTY SUPERFUND SITE OU#4 TREECE SUBSITE CHEROKEE COUNTY, KANSAS (SOL)
U.S. Environmental Protection Agency, Region 7, Lenexa, KS
Contract Opportunities on SAM.gov 68HE0725R0021, 2025

This is a service-disabled veteran-owned small business set-aside under NAICS code 562910. The U.S. Environmental Protection Agency, Region 7, requires a contractor for the excavation, consolidation, and disposal of mine waste and associated soil/sediments contaminated with heavy metals at Operable Unit 4 on the Cherokee County Superfund site in Kansas. For this PWS, the term "mine waste" includes visible mine waste (chat, tailings, and waste rock), and underlying soil and sediments contaminated with heavy metal concentrations exceeding the cleanup standards/goals. The period of performance for this contract is one Base Year and one option year. Offers are due by 2:00 PM CDT on July 22, 2025. https://sam.gov/opp/41e223573127 4ffcb646e280d55193e0/view

NTCRA UNDER CERCLA AT INDIANA DUNES NP (PRESOL)
U.S. Department of the Interior, National Park Service, Washington Contracting Office, Lakewood, CO
Contract Opportunities on SAM.gov 140P2125R0039, 2025

When this solicitation is released on or about July 8, 2025, it will be competed as a service-disabled veteran-owned small business (SDVOSB) set-aside under NAICS code 562910. The National Park Service requires a contractor to implement Non-Time Critical Removal Action (NTCRA) specifications at the Indiana Dunes National Park's Pinhook Bog Debris Site in Porter, Indiana. The work includes removing approximately 1,350 bank cubic yards (estimated to be 2,500 tons) of solid waste and commingled soil (some of which is contaminated and may be classified as hazardous), characterizing the material, transporting it to appropriate disposal facilities, collecting and analyzing confirmation samples, and preparing a Removal Action Completion Report (RACR). The estimated removal quantities are based on previous site investigations. The award will be a firm-fixed-price contract that will use a combination of lump-sum and unit-priced items. A group site visit is scheduled on the morning of July 23, 2025. Pertinent details will be provided in Section L of the solicitation. Attendance at the site visit is strongly encouraged (not mandatory). Requests for individual site visits will not be honored. There is no solicitation at this time. https://sam.gov/opp/bd45a62e211c4c218e4abd4387e010eb/view

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Cleanup News

AN INTEGRATED STRATEGY TO TREAT AND CONTROL ACID MINE DRAINAGE FROM WASTE ROCK AND UNDERGROUND WORKINGS AT THE FORMER FRANKLIN MINE IN NOVA SCOTIA, CANADA: FIELD PERFORMANCE MONITORING
Power, C. I Pollutants 5(1):1(2025)

The former Franklin mine was impacted by the deposition of waste rock across the site and the discharge of mine water from underground workings. Site reclamation involved excavating the dispersed waste rock (117,000 m^2) and backfilling with clean soil; consolidating the excavated waste rock into a covered, compact waste rock pile (WRP) (25,000 m^2); and constructing a passive treatment system to discharge underground mine water. An extensive field sampling program was conducted to monitor a range of meteorological, cover material, waste rock, groundwater, and surface water quality parameters. Results confirm that the multi-layer, geomembrane-lined WRP cover system is an extremely effective barrier to air and water influx, minimizing the rate of AMD generation and seepage into groundwater and eliminating all contaminated surface water runoff. A small AMD groundwater plume emanates from the base of the WRP, with 50% captured by the underground mine workings over the long term and 50% slowly migrating towards Sullivan's Pond, the main environmental receptor. Excavating the former waste disposal area eliminated the AMD source from the previously dispersed waste, with only clean surface water runoff and a diminishing legacy groundwater plume remaining. The passive treatment system, which contains a series of treatment technologies, such as a limestone leach bed and settling pond, successfully treats all mine water loading (~50 kg/day) discharging from the underground workings and surface runoff. Its additional treatment capacity (up to ~150 kg/day) ensures it can manage any potential drop in treatment efficiency and/or increased AMD loading from long-term WRP seepage.*This article is* ***Open Access*** *at* https://www.mdpi.com/2673-4672/5/1/1.

SOIL GAS SURVEY RESULTS SUPPORTING GROUNDWATER CORRECTION ACTION PLAN (GCAP) DEVELOPMENT FOR THE MOAB SITE
Looney, B.B., H.H. VerMeulen, A. Coleman, K. Pill, T. Prichard, and J. Ritchey. SRNL Report SRNL-STI-2024-00227, 73 pp, 2024

A soil gas survey was performed at the Moab Uranium Mill Tailings Remedial Action Project site to confirm, identify, quantify, and refine secondary contaminant source area locations for uranium and ammonium/ammonia (NH_4^+/NH_3) in the vadose zone and shallow groundwater and assist in developing the technical basis for the GCAP. Specifically, the soil gas data will support the deployment of source control technologies where supplementary capping, removal actions, or amendments might be beneficial. Surrogate gases were used during the survey as indicators for contaminants of concern. The gas-phase surrogate-indicator for uranium and its associated radionuclides was radon, and the surrogate-indicator gas phase analytes for NH_4^+/NH_3 were NH_3 and N_2O. General geochemical indicator soil gases were also measured. Soil gas samples were collected from 58 locations that represented the Mill Yard, Tailings, North Off-Pile, and Wellfield/Riverbank areas. In addition, features associated with former mill operations and other historical features were identified and targeted to support a high degree of granularity in the data interpretation. The shallow soil gas survey was effective in identifying residual sources of uranium and ammonium in the subsurface. It also identified general-areal differences in residual subsurface sources and small residual hot spot sources associated with the containment pond in the Mill Yard area and the purification pond in the Tailings Area. https://www.osti.gov/servlets/purl/2467336 .

STORIES FROM A QUARTER CENTURY OF COVER SYSTEM DESIGN: LEARNINGS TO INFORM THE FUTURE
O'Kane, M. I British Columbia 47th Mine Reclamation Symposium, 23-26 September, Burnaby, British Columbia, 16 pp, 2024

This paper highlights key considerations for designing cover systems in British Columbia, including lessons learned and factors to consider when designing for future climate change scenarios. https://open.library.ubc.ca/media/download/pdf/59367/1.0442215/3

INVESTIGATION ACIDIC DISCHARGES AT THE MONAHAN ABANDONED MINE LANDS SITE, KANSAS
Behum, P., M. Spence, J. Arruda, R. Johnson, and C. Kiser. I American Society of Reclamation Sciences 41st Annual Meeting, 2-5 June, Knoxville, TN, 29 slides, 2024

A remediation project was conducted at a coal mine waste facility on the Monahan Outdoor Education Center. The Monahan Refuse Disposal Area is an 80-acre site that was both a surface and underground mine and coal processing facility. Acid mine drainage (AMD) is discharging from the former coal refuse pile. Prior to remediation, a hydrologic baseline study was conducted to evaluate AMD sources. Dilution was necessary with alkalinity-bearing water from a large final pit impoundment with an average combined flow of 17.7 GPM, estimated by a weir installation. Engineering tests were performed on a dilution water/AMD mix at a 1:1 ratio, suggesting that acidity derived from dissolved metals and pH will yield a calculated acidity of 442 mg/L. A conceptual design was completed that proposed remediation using a passive treatment system (PTS), which was designed and constructed in 2023. The PTS employs 1) dilution to lower the acidity and metal content, 2) low pH iron oxidation, 3) treatment by a vertical flow pond (VFP), 4) precipitation of metals in an oxidation pond and aerobic wetland, and 4) secondary dilution with alkaline water added near the system outlet. Jar tests suggest 160 mg/L calcium carbonate equivalent alkalinity will be generated by the VFP. The secondary dilution water source should provide an estimated 62 mg/L calcium carbonate equivalent additional alkalinity. Initial results of system operation are also presented. https://www.asrs.us/wp-content/uploads/2024/08/Behun_301F.pdf

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Demonstrations / Feasibility Studies

INFLUENCE OF SEWAGE SLUDGE COMPOST ON HEAVY METALS IN ABANDONED MINE LAND RECLAMATION: A LARGE-SCALE FIELD STUDY FOR THREE YEARS
Dong, Y., B. Yu, Y. Jia, X. Xu, P. Zhou, M. Yu, and J. Liu. I Journal of Hazardous Materials 486:137098(2025)

A field study analyzed the dynamic changes in heavy metal composition in topsoil, surface runoff, and subsurface infiltration after large-scale reclamation. Sewage sludge compost (SSC) application promoted plant growth by 2-4 times, enhanced the physicochemical structure of the topsoil, and increased the levels of organic matter and inorganic nutrients. Most heavy metals exhibited higher retention in SSC-treated areas compared to non-SSC areas and remained within low toxicity risk levels overall. Surface runoff from areas with high SSC content exhibited elevated concentrations of heavy metals. In one sample, Cd, Cu, Pb, and Zn concentrations were at least 1.5 times that of M0. Mixing the SCC application further mitigated the subsurface Cr, Cu, Pb, and Zn migration compared to S120, with concentrations of As, Cr, Pb, and Zn in the sample being less than 1/10 of those in M0. Correlation analysis demonstrates that SSC regulated topsoil pH and the contents of organic matter, phosphorus, and Fe and Al (hydr)oxides, which synergistically enhanced the adsorption and complexation of most toxic heavy metals, reducing their migratory pollution over time. The study suggests that practical SSC application (up to 225 t/ha) results in long-term effects on heavy metals characterized by in situ multi-effect stabilization, rather than increasing overall environmental risks, and provides a technological foundation for ensuring the safe use of SSC in mine reclamation.

SITE-SPECIFIC GBBR TECHNOLOGY MATURATION FOR WATER TREATMENT AT THE COPPER MOUNTAIN MINE
Simair, M.C., F.L. Young, C. Hughes, M. DesJardins, and S. Brandt. I British Columbia 47th Mine Reclamation Symposium, 23-26 September, Burnaby, British Columbia, 16 pp, 2024

This presentation details the site-specific technology readiness level (TRL) advancement of Maven's mBio gravel-bed biochemical reactor (GBBR) technology for the Copper Mountain Mine in British Columbia. Contaminants of potential concern include nitrate, selenium, molybdenum, copper, sulphate, and uranium. The technology maturation plan included onsite testing of pilot-scale GBBRs with mFlex units paired with column trials at climate-controlled facilities. Multiple conditions and scenarios were tested to inform on potential operational risks and identify appropriate controls and management strategies. The testing program included varying conditions, such as altering flow rates, temperatures, and reagent dosages to assess optimal operational parameters. Reagent dosing was optimized depending on potential future variations of water chemistries and flows. Additional modifications to reagents and amendments were tested for the enhanced treatment of selenium and molybdenum. Findings confirmed the extent and rates of treatment of the targeted constituents, as well as their final fate and distribution in the GBBR. This GBBR technology is now at a site-specific TRL-7, ready for onsite demonstration and advancement to TRL-8. https://open.library.ubc.ca/media/download/pdf/59367/1.0442215/3

FRACTIONATION OF CRITICAL METALS FROM AUTHENTIC ACID MINE DRAINAGE USING A MULTI-BED IMMOBILIZED AMINE SORBENT SETUP: A FIELD SITE STUDY
Wilfong, W.C., Q. Wang, B. Howard, P. Tinker, K. Johnson, W. Garber, F. Shi, and M.L. Gray.
Journal of Water Process Engineering 58:104788(2024)

DOE's National Energy Technology Laboratory's patented Multi-functional Sorbent Technology (MUST) sorbents were employed to fractionate purified critical metals and recover critical metals from acid mine drainage at the Pittsburgh Botanic Garden. By adjusting the AMD/sorbent ratio, >80 % of pure adsorbed Mn (by adsorbed metal weight) and >90 % pure adsorbed Al were recovered at lab-scale. Further optimizing the weight hourly space velocity enhanced the rate of adsorbed Al recovery by over five times, justifying a field site test. After treating >100 L of AMD at the field site, the optimized polyamine/epoxysilane/aminosilane sorbent recovered ~0.7 wt% adsorbed Al at >90 % purity. A tangible amount of purified aluminum hydroxide and aluminum sulfate solids were then recovered after eluting and precipitating the previously adsorbed metals.https://www.osti.gov/servlets/purl/2305454.

BENEFICIAL USE OF HARVESTED PONDED FLY ASH AND LANDFILLED FGD MATERIALS FOR HIGH-VOLUME SURFACE MINE RECLAMATION
Butalia, T.S., A. Shafieezadeh, and J. Lenhart for the U.S. DOE, 166 p, 2024

This project aimed to demonstrate lab, bench-scale, and full-scale demonstrations, that: 1) coal ash surface impoundments can undergo closure through removal in compliance with EPA and state regulations, allowing the material to be used in high-volume beneficial applications; 2) flue gas desulfurization (FGD) material from closed FGD facilities can be excavated and recompacted for coal mine reclamation; and 3) harvested coal combustion residuals (CCRs) can be beneficially utilized in large volumes for reclamation at abandoned coal mine sites across the U.S., especially in the Eastern and Midwest coal mining regions. Results demonstrate the potential for large-scale application of the research findings. The study supports the notion that harvested ponded fly ash and landfilled FGD materials can be beneficially utilized for high-volume surface mine reclamation based on geography. Assuming the engineering and logistics are feasible, the processes developed could be applied to several power plants in each state analyzed. Furthermore, the nationwide applicability offers inspiration for all states and regions with coal-fired power plants and abandoned coal mine land hazards. Data collected from the monitoring network at the full-scale reclamation site will continue to be analyzed to assess the impacts of reclamation activities on the water quality of the nearby surface waters and underlying aquifers. Additional isotope analysis of $\delta^{11}B$ and $^{87}Sr/^{86}Sr$ is needed to determine CCR in leachate waters. Water quality monitoring should be supplemented with isotopic analysis and biological monitoring of stream life. The model assumed that all hydrogeologic parameters remained constant, including porosity, groundwater flow, permeability, isotropic hydraulic conductivity, and dispersity. These inputs were derived from site technical reports and sFGD characteristics. However, hydrogeologic parameters are often uncertain, and their impacts may need further investigation. https://www.osti.gov/servlets/purl/2447633.

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Research

MOLECULAR BIOLOGICAL TOOLS FOR MONITORING SELENIUM REDUCTION IN MINE INFLUENCED WATER
Dennis, P., L. Smith, M. Vachon-Gregory, A. Rahman, J. Roberts, A. Holmes, and S. Mancini.

AEHS Foundation 40th Annual International Conference on Soils, Sediments, Water and Energy 21-24 October, Amherst, MA, 24 slides, 2024 Quantitative polymerase chain reaction (qPCR) tests, next-generation sequencing (NGS), and differential plating methods combined with genetic colony identification were used to detect and characterize microbial communities that reduced selenate (SeO_4^{2-}) to selenite (SeO_3^{2-}) or SeO_3^{2-} to elemental selenium (Se). Selenate

metabolic pathways were used to develop specific qPCR tests, which were then used to quantify specialized SeO_4^{2-} reducing microbial communities. A new functional category made from microbial taxa involved in Se reduction was added to a microbial functional database to monitor Se metabolism through NGS. The database was used to summarize the proportion of Se metabolizers in the context of other metabolic functions and indicated the presence of both specialized and non-specialized selenium reducers. Additionally, microbes from a known Se-reducing site were plated, and colonies of selenite-reducing bacteria were grown and isolated. PCR amplification of the 16S rRNA gene combined with Sanger sequencing was used to identify the bacteria. Combining novel and classic molecular biological tools provides multiple lenses to view selenium metabolizing communities and can increase the ability to understand how microbiology impacts treatment processes for selenium. https://s3.amazonaws.com/amz.xcdsystem.com/A51108D5-EA2F-2B6D-01D92AC0F42DCE3B_abstract_File24087/Handout_282_1029041728.pdf

ENHANCED METALS PRECIPITATION IN ACID MINE DRAINAGE BY THERMAL ACTIVATION MAGNESITE-PINE SHAVINGS DISPERSED ALKALINE SUBSTRATE

Xu, F., L. Liang, Q. Liu, J. Qin, Y. Liao, and J. Yuan. Environmental Technology [published online 27 January 2025 before print]

A study employed a dispersed alkaline substrate (DAS) consisting of thermal activation magnesite and pine shavings to treat AMD. The investigation focused on determining the optimal thermal activation conditions of magnesite, evaluating DAS effectiveness in regulating acidity and removing metal ions from AMD, identifying critical factors influencing treatment efficiency, and conducting a toxicity assessment on the effluent. Results showed that calcination at 700˚C for 60 min was the optimal thermal activation condition for magnesite. Under optimal operating conditions (flow rate: 0.4 mL/min, filling mass ratio: thermal activation magnesite to pine shavings = 1:1), the system achieved complete removal (100%) of metal ions within 396 hrs, while maintaining a pH above 7.0. It also significantly minimized operating costs and sludge generation. Toxicity assessment experiments conducted using *Chlorella proteolytica* demonstrated a significant reduction in biotoxicity after treatment. Findings suggest that a DAS based on thermal activation of magnesite holds promise as an effective solution for treating AMD.

IMMOBILIZATION OF CHROMIUM BY IRON OXIDES IN NICKEL-COBALT LATERITE MINE TAILINGS

Delina, R.E., J.P.H. Perez, V.V. Roddatis, J.A. Stammeier, D. Prieur, A.C. Scheinost, M.M. Tan, J.J.L. Garcia, C.A. Arcilla, and L.G. Benning.
Environmental Science & Technology 59(11):5683-5692(2025)

This study coupled detailed mineralogical, spectroscopic, and geochemical characterization with sequential extraction of tailings from active and rehabilitated dams to show that Cr is present in its least toxic form, Cr(III), and largely immobilized by recalcitrant minerals. Immobilization also regulates dissolved Cr concentrations in the interacting waters to levels up to five times lower than the global regulatory limit (50 µg/L). Solid-phase Cr concentrations were ≤1.5 wt% with 39-61% of Cr incorporated into hematite, and to a lesser extent, alunite, both of which formed early in the hydrometallurgical extraction process of mined laterite ores. The remaining Cr was present as recalcitrant chromite residues from the primary source laterites. Although hydrometallurgical extractions liberate Cr from laterite ores during processing, they also provide ideal chemical pathways to form highly stable, crystalline hematite that successfully sequesters Cr, while restricting its environmental mobility.

EFFECT OF COPPER MILL WASTE MATERIAL ON BENTHIC INVERTEBRATES AND ZOOPLANKTON DIVERSITY AND ABUNDANCE

Larson, J.H., M.R. Lowe, S.W. Bailey, A.H. Bell, and D.M. Cleveland.
PLoS ONE 20(3):e0318980(2025)

Stamp sands (SS), a pulverized ore by-product produced from copper stamp mill mining, were originally deposited near a Lake Superior beach. However, erosion and wave action moved SS into beaches and reefs that are critical spawning and nursery areas for native fish, where larval and juvenile native fish consume zooplankton and benthic invertebrates during their development. In this study, the invertebrate community from beaches with high, moderate, and low SS, as well as a control beach 58 km from the source of the SS, was sampled. The high SS site was characterized by fewer benthic taxa and lower density of several taxa than the low SS site, especially benthic copepods. All beaches had comparable zooplankton diversity, though the abundance was ~2 orders of magnitude lower than the high SS site. Cu and several other metals were elevated at beaches with more SS. Associations between benthic density and diversity with depth (positive effect) and Cu concentration (negative effect) were found. Cu concentration was a better predictor of declines in benthic invertebrate abundance and diversity than SS, although sensitivity to Cu varied among taxa. Also, the relationship between Cu concentration and SS was non-linear and highly variable. For example, 149 mg Cu/kg dry weight sediment is a consensus threshold used in the literature to identify Cu toxicity, but the prediction interval for estimating that concentration of Cu from measurements of SS is 26-851 mg Cu/kg dry weight. A better predictive model of this relationship would be beneficial to develop an understanding of what level of SS reduction would prevent Cu impacts on invertebrates. https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0318980&type=printable

SOIL HEALTH ALTERATIONS VIA COMPOST ADDITIONS TO NATURAL AND REMEDIATED HEAVY METAL-CONTAMINATED MINELAND SOILS

Umeobi, E.C., T.F. Ducey, M.G. Johnson, and J.A. Ippolito.
Environmental Science and Pollution Research(2025)

The Oronogo-Duenweg Mining Belt is an EPA Superfund site due to lead-contaminated soil and groundwater from historic mining and smelting operations. Remediation has removed Pb-contaminated overburden, uncovering nutrient-deficient C horizons containing elevated Cd and Zn concentrations, which impede natural revegetation. A study evaluated compost at rates of 180 and 360 Mg/ha, monitoring changes in soil properties observed at naturally revegetated sites, native prairie locations, and areas receiving compost treatments. The Soil Management Assessment Framework (SMAF) was employed to assess physical, chemical, nutrient, and biological soil health indicators and soil health scores. Soil metal concentrations were analyzed using Mehlich-3 and 0.01 M $CaCl_2$ extractions; plant metals were extracted with HNO_3 and H_2O_2. Compost-treated soils exhibited overall soil health comparable to native prairie; both had greater overall soil health than the natural revegetation site. However, 360 Mg/ha rate led to excessive Mehlich-3 extractable P compared to 180 Mg/ha. Mehlich-3 extractions revealed that the compost added Cd and Zn to the system, yet Cd and Zn concentrations from the 0.01 M $CaCl_2$ extraction were negligible in the compost-treated soils. Plant heavy metal concentrations were below tolerable limits for livestock consumption. A target compost application rate of 180 Mg/ha, or lower, is suggested for balancing phosphorus and metal concentrations while improving overall soil health. *This article is* ***Open Access*** *at* https://link.springer.com/article/10.1007/s11356-025-36602-1

GEOCHEMICAL BEHAVIOR OF AMENDED AND NON-AMENDED MINE TAILINGS AS COVER MATERIALS FOR ACID MINE DRAINAGE CONTROL: COLUMN TESTS AND REACTIVE TRANSPORT MODELING

El-Affani, L., B. Bussiere, A. Qureshi, and B. Plante.
Journal of Contaminant Hydrology 272:104564(2025)

A study assessed the performance of amended and non-amended low-sulfide tailings and non-acid generating waste rock as components of capillary barrier effects (CCBEs). Five column tests were conducted in the lab to assess the long-term geochemical evolution of waste-rock, low-reactive tailings (2 % pyrite), tailings amended with 8 wt% of limestone, CCBE with the moisture-retaining layer (MRL) made of low-reactive tailings (CCBE-T), and CCBE with the MRL made of amended tailings (CCBE-TA). The geochemical evolution of leachates from the different column tests was simulated using the multicomponent reactive transport model, MIN3P. The numerical model was calibrated using results from the column tests. Long-term simulations using the short-term calibrated models suggested that low-reactive tailings could produce AMD when exposed to lab conditions, while limestone amendments effectively neutralized the generated acidity and stabilized the pH. Furthermore, incorporating tailings as an MRL in a CCBE reduced sulfide oxidation in the long term due to the high degree of saturation that limited oxygen diffusion and sulfide reactivity.

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General News

CRITICAL MINERAL RECOVERY FROM MINE INFLUENCED WATERS – LITERATURE REVIEW AND TECHNOLOGY EVALUATION

Bronstein, K., K. Whiting, C. Schroer, L. Mulrooney, A. Neisess, N. Norris, R. Olsen, and N. Revetta. EPA/600/R-25/038, 70 pp, 2025

A literature review and technology screening were conducted for critical mineral (CM) recovery from mining-influenced waters (MIW). The primary objectives were to identify and evaluate technologies that could potentially enhance the efficiency and sustainability of Superfund remedial and response actions by facilitating alternative and supplemental CM recovery. Given the array of CMs across the periodic table of elements, recovery technologies were pursued that focused on the Lanthanide series with atomic numbers 57-60 and 62-71. Other CMs of interest (with atomic number) discussed in lesser detail included Li (3), Sc (21), Co (27), Y (39), and Sb (51). Findings were categorized into four key CM processing stages: 1) beneficiation: separation of CM from gangue minerals or ions; 2) extraction: purification to ~ 70% CM; 3) separation: final purification to over 99% CM, including the separation of individual rare earth elements (REE); and 4) alloying: creation of saleable products for industrial use. The literature review included a range of studies, from bench-scale lab tests to analyses of mine water effluent, tailings, leachate, and coal ash samples. Given the vast spectrum of prospective recovery technologies, an initial high-level screening was conducted to filter out less viable options, ultimately identifying 46 technologies. From these 46, a scoring system was applied and 15 CM recovery technologies were identified. A list of six technologies were proposed for continued research and evaluation from the beneficiation, extraction, and separation processing stages. The report highlights technologies available for CM, or more specifically, REE recovery, acknowledging the unique challenges posed by chemical similarities between REE. Due to the experimental nature of several identified technologies, further research is needed to determine their viability. The report serves as a foundational document for advancing CM recovery efforts, emphasizing the importance of continued research and evaluation to support sustainable practices in mineral resource and waste management.
https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=366102&Lab=CESER&simplesearch=0&showcriteria=2&sortby=pubDate&searchall=mine&timstype=&datebeginpublishedpresented=06/23/2023

REMEDIATION OF MINE OVERBURDEN AND CONTAMINATED WATER WITH ACTIVATED BIOCHAR DERIVED FROM LOW-VALUE BIOWASTE

Padhi, P., N. Bora, P. Sohtun, M. Athparia, M. Kumar, R. Kataki, and P.K. Sarangi.
Journal of the Taiwan Institute of Chemical Engineers 159:105472(2024)

This review emphasizes the type of mines and overburden generation, their impact on soil and water, and the utility of different biowastes available to be mobilized into biochar to remediate contaminated water and soil. It also bridges the gap in the current knowledge of biochar activation techniques with heavy metals remediation.

ADVANCES IN REMEDIATION: EMERGING OPPORTUNITIES FOR BENEFICIAL RECOVERY OF CRITICAL MINERALS FROM METAL-IMPACTED WATERS DURING REMEDIATION

Divine, C., J. Gillow, P. Spina, S. Ulrich, C. Griggs, and A. Bednar.
Groundwater Monitoring & Remediation 45(2):12-27(2025)

This review 1) explores innovative strategies to recover critical minerals from water sources affected by metal contamination, such as groundwater and mine-influenced waters; 2) emphasizes the potential to transform environmental remediation efforts into economically beneficial processes by extracting valuable minerals like lithium, cobalt, and rare earth elements during cleanup operations; and 3) discusses current technologies, challenges, and future prospects in integrating mineral recovery with water remediation, aiming to support sustainable resource management and reduce reliance on traditional mining practices.

REVIEW OF THE POTENTIAL FOR SELENIUM REMOBILIZATION IN SEMI-PASSIVE TREATMENT SYSTEMS OF MINE IMPACTED WATERS

Kratochvil, D., H.-C. Liang, C. Anderson, B. Rezania, and B. Baker.
Journal of Environmental Management 375:124194(2025)

Saturated rock fill (SRF) technology may treat over 170,000 m3/day of mine-impacted water in southwest British Columbia, Canada, and operate for decades or longer. Following closure, the SRFs will retain significant quantities of selenium removed from water in perpetuity. Despite advancements in physical design and understanding operational performance of SRFs, little information is available on the long-term fate and stability of the reduced Se0 retained in the system following closure. This article reviews available and relevant scientific literature to highlight the significance of this knowledge gap. Based on an extensive literature review and analyses using known, published chemical reactions, it discusses conditions in which immobilized Se0 formed from selenate and selenite bioreduction in the SRFs can remobilize and proposes actionable steps to better understand the future environmental implications of implementing the SRFs.

LEVERAGING PLANT-BASED REMEDIATION TECHNOLOGIES AGAINST CHROMITE MINING TOXICITY

Mohanty, C. and C.I. Selvaraj. International Journal of Phytoremediation 27:2(2025)

This review highlights the impact of Cr(VI) on different living biotas and emphasizes the use of plants and plant-based materials for the sustainable remediation of chromite mining regions.

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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