Entries for February 16-28, 2026

Market/Commercialization Information

REQUEST FOR PROPOSAL FOR ENVIRONMENTAL REMEDIATION SERVICES (ERS) SINGLE AWARD TASK ORDER CONTRACT (SATOC) FOR THE SHAW AIR FORCE BASE OPTIMIZED REMEDIATION CONTRACT (ORC) (SOL)

U.S. Army Corps of Engineers, South Atlantic Engineer Division, Savannah District, Savannah, GA
Contract Opportunities on SAM.gov W912HN26RA009, 2026

This is a total small business set-aside under NAICS code 562910. The U.S. Army Corps of Engineers, South Atlantic Engineer Division, requires a contractor to provide Environmental Remediation Services (ERS) under a $40 million Single-Award Task Order Contract (SATOC) for the Shaw Air Force Base Optimized Remediation Contract. The objective is to achieve site closure for unrestricted residential use in accordance with the installation's RCRA permit. Work includes remediation at 18 Installation Restoration Program (IRP) sites and operation and maintenance of two groundwater treatment plants, with varying performance objectives, including RA-O, IRA-O, LTM, and alternative objectives. The contract will be firm fixed-price with a seven-year ordering period and one six-month option. Offers are due by 2:00 PM EDT on April 24, 2026. https://sam.gov/workspace/contract/opp/22379d5625af434c8910fcdef026e444/view

MISSISSIPPI GROUP OPTIMIZED REMEDIATION CONTRACT AT COLUMBUS AIR FORCE BASE, MISSISSIPPI, KEESLER AIR FORCE BASE, MISSISSIPPI (SOL)

U.S. Department of the Air Force, Air Force Materiel Command, Installation and Mission Support Center, JBSA Lackland, TX
Contract Opportunities on SAM.gov FA890326R0001, 2026

This is an 8(A) set-aside under NAICS 562910. The U.S. Department of the Air Force requires a contractor to provide environmental remediation activities at Columbus Air Force Base (AFB) and Keesler AFB in Lowndes County in northeastern Mississippi under the Optimized Remediation Contract. The range of activities includes investigation, design, construction of remedial systems, operation and maintenance of established remedies, optimization at applicable sites, and achievement of site-specific objectives. The Contractor shall undertake environmental remediation activities to achieve performance objectives at 17 Installation Restoration Program sites. Offers are due by 2:00 PM CDT on April 16, 2026.
https://sam.gov/workspace/contract/opp/6678c2ec7d0f48429b4bb27b60edd130/view

SOURCES SOUGHT NOTICE - FISCAL YEAR (FY) 2027 FLORIDA PANHANDLE OPTIMIZED REMEDIATION CONTRACT (ORC) AND MILITARY MUNITIONS RESPONSE PROGRAM (MMRP) (SRCSGT)

U.S. Army Corps of Engineers, South Atlantic Engineer Division, Mobile, AL
Contract Opportunities on SAM.gov W9127827RA002, 2026

This is a sources sought notice for marketing research purposes only under NAICS code 562910. The U.S. Army Corps of Engineers seeks responses from qualified firms interested in supporting the FY27 Florida Panhandle Group Optimized Remediation Contract (ORC) and Military Munitions Response Program at Eglin Air Force Base, Hurlburt Field, and Tyndall Air Force Base in Florida. The project involves comprehensive environmental remediation services across multiple sites, including investigation, design, construction, operation and maintenance, optimization, and achievement of site-specific performance objectives. The Contractor will support remediation at 59 IRP sites and five MMRP sites across Eglin AFB, Hurlburt Field, and Tyndall AFB, in accordance with applicable regulatory frameworks such as RCRA, CERCLA, and Florida Administrative Code requirements, with oversight primarily from the Florida Department of Environmental Protection and USEPA Region 4. Certain petroleum-contaminated sites will be addressed under state cleanup criteria, and any sites deferred from CERCLA will meet performance objectives with regulatory approval. The effort will be executed as a competitive, firm-fixed-price, definite-delivery contract using a best-value tradeoff approach, with an estimated value of $40 million and a 10-year period of performance consisting of a 5-year base and 5-year option period. The type of set-aside decision(s) to be issued will depend upon the capabilities of the responses to this synopsis. Responses are due by 3:00 PM CDT on April 22, 2026. https://sam.gov/workspace/contract/opp/4bd1855ad8424115afbb78c72739bd7b/view

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Cleanup News

FROM REHABILITATION TO RESTORATION: A 12-YEAR CASE STUDY

Haagner, A. and F. van Wyk. Proceedings of the 18th International Conference on Mine Closure, 12 pp, 2025

The development of post-mining restoration efforts on a platinum mine has been tracked for the past 12 years, and findings have been used to guide the maintenance actions required to sustain ecosystem recovery trajectories. The extensive monitoring framework covers landform recreation, soil hydrology and physics, soil chemistry and microbial activity, vegetation dynamics, and recolonization of rehabilitating sites by birds, mammals, reptiles, and amphibians. The paper shows how the original rehabilitation-focused planning transformed into a restoration mindset. Shifts in ecosystem resilience following droughts, fires, and intensive grazing, as well as social expectations (the majority of the site is within the Marikana Thornveld vegetation type, recently uplisted to endangered status), required ongoing planning and management responses. The ecosystem responses to post-disturbance ecological development have shown improving trends across 12 years of monitoring, with stochastic deviations from trends observed for different taxa under varying prevailing conditions. The long-term nature of the monitoring program allowed for high-confidence trend analyses that inform restoration planning and maintenance activities. While restoration efforts were not perfectly executed, and external ecosystem stressors have hampered consistent ecosystem development, the case study shows the importance of undertaking rehabilitation and restoration activities within a clear framework that is outcome-oriented and data-driven. https://papers.acg.uwa.edu.au/d/2515_94_Haagner/94_Haagner.pdf

CENTRAL MINE REMEDIATION: SUCCESS STORY OF CLOSURE OF ANOTHER LEGACY MINE IN MANITOBA

Ahmeduzzaman, M., C. Graham, and D. Adedapo. Tailings and Mine Waste 2025 Conference, 2-5 November, Banff, AB, Canada, 16 pp, 2025

The abandoned Central Manitoba Mine (CMM) in Nopiming Provincial Park, Manitoba, posed significant environmental and public safety hazards due to acid-generating tailings, waste rock stockpiles, deteriorated infrastructure, and open mine shafts connected to an extensive underground network. This paper presents the design and implementation of a hybrid capping system engineered to mitigate acid-generating tailings, prevent contamination, and enhance site stability. The design considered a potentially liquefiable foundation, high groundwater conditions, material availability, long-term performance, and constructability challenges. The system incorporated Draintube technology, high-density polyethylene geomembrane liner, and nonwoven geotextile layers to ensure durability and minimize environmental impact. Remediation also included site regrading, tailings encapsulation, concrete capping of mine openings, and debris removal to restore the site. Construction was carefully planned and staged to minimize the risk of tailings liquefaction and prevent the release of tailings downstream. A rigorous quality control and assurance program was implemented to ensure that the remediation work met the design specifications and the vision of all stakeholders. Continuous monitoring and testing were conducted throughout the construction process to verify compliance and optimize material usage. The project was completed ahead of schedule and within budget, demonstrating the effectiveness of innovative engineering design in mine site rehabilitation. The paper highlights the key technical considerations, challenges, and lessons learned, contributing to the ongoing advancement of environmental stewardship and public safety in mine remediation. https://drive.google.com/file/d/1w-7RMt2IOF8SRjA-RE5yYJ9m2IUm1mlKE/view

BLACKLICK CREEK - THE DEATH AND RESURRECTION OF A WATERSHED

Smoyer, J. and R. Farabaugh. 27th Annual PA AMR Conference, 14-16 October, State College, PA, 41 minutes, 2025

This presentation reviews the history of coal mining in Vintondale and Wehrum and explains how this history set the stage for the pollution and recovery of Blacklick Creek. The Bureau of Abandoned Mine Reclamation's $28 million acid mine drainage treatment plant, which began running in the spring of 2025, is highlighted along with initial post-treatment water quality data.
https://www.youtube.com/watch?v=g1SI4gKFXP4

PROJECT BACKGROUND, DEVELOPMENT AND DESIGN FOR THE LITTLE CONEMAUGH MINE DRAINAGE TREATMENT PLANT PROJECT, CAMBRIA COUNTY, PA

Cavazza, E. 27th Annual PA AMR Conference, 14-16 October, State College, PA, 41 minutes, 2025

Drainage from abandoned coal mining operations significantly impacted the Little Conemaugh River Watershed. The Pennsylvania Department of Environmental Protection, in partnership with several other federal, state, and local government entities and non-governmental organizations, began efforts in 2016 to restore the Little Conemaugh River from its headwaters to its confluence with the Stonycreek River in downtown Johnstown, a distance of ~15 stream miles. The effort is focused on the three most upstream major AMD discharges, including the Hughes Borehole, the Sonman Borehole Discharges, and the Miller Shaft Discharge. A restoration goal of biological recovery of the stream to support a recreational fishery was established. The water quality goals include maintaining the stream pH between 6.0 and 9.0, the alkalinity greater than acidity, the total iron <1.5 mg/L, the total aluminum <0.5 mg/L, and the total dissolved solids (TDS) <1,500 mg/L during normal stream flow. Property was purchased to obtain permanent right of way for a large-scale active mine drainage treatment plant (12,000 GPM maximum hydraulic capacity) and for a mine water conveyance and transfer pipeline. The design of the Little Conemaugh Mine Drainage Treatment Plant (LCMDTP) was completed in December 2024. Background information, including details about the abandoned mines, the major discharges (flow and chemistry), and the current design plan and schedule for the LCMDTP, is presented.
https://www.youtube.com/watch?v=VYUN_2xS2I0

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Demonstrations / Feasibility Studies

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)

A pilot employed a flow-through multi-fixed-bed immobilized amine/silica sorbent strategy to fractionate purified critical metals from authentic acid mine drainage (AMD). DOE's National Energy Technology Laboratory's patented Multi-functional Sorbent Technology sorbents were used to recover critical metals from AMD 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 (WHSV) enhanced the rate of adsorbed Al recovery by over 5x, 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 was then recovered after eluting and precipitating the previously adsorbed metals.

BIOACCUMULATION OF ARSENIC IN MINE WASTE CONTAMINATED SOIL USING *POA LABILLARDIERI*++998 (STEUD.) AND SOIL AMENDMENTS: A SHORT-TERM PILOT TRIAL

Besedin, J.A., D.A. Besedin, L.S. Khudur, S.K. Biek, G. Aguilar Jr., P. Netherway, A. L. Juhasz, S. Horner, and A.S. Ball. Science of The Total Environment 1020:181602(2026)

Historic gold mining in Australia produced arsenic-contaminated waste, and Victoria has reported arsenic concentrations up to 47,100 mg/kg in impacted soil. Soil arsenic concentrations above 100 mg/kg in residential soil with garden access require site-specific management and remediation. A 6-month pilot was conducted to investigate *P. labillardieri* for plant growth and arsenic bioaccumulation under field conditions and assess soil amendment, 5% biosolids biochar (wet weight (w/w)) plus 5% compost (w/w), for optimization. Objectives included quantification of soil characteristics, soil and plant metal(loid) concentrations by acid digestion, arsenic bioaccumulation, and microbial analyses by quantitative polymerase chain reaction. *P. labillardieri* successfully grew and bioaccumulated arsenic under field conditions with and without the amendment (5% biochar plus 5% compost). The plant-only treatment significantly ($p = 0.01$) bioaccumulated more arsenic in the roots (~108 mg/kg) than plant plus amendment (~55 mg/kg); and had a significantly ($p = 0.017$) higher bioconcentration factor, demonstrating the plant's potential for phytostabilisation without assistance. A long-term field trial with additional analyses is recommended to validate *P. labillardieri* and the soil amendment for phytostabilisation of gold mine waste-impacted soil.
https://www.sciencedirect.com/science/article/pii/S0048969726002639/pdfft?md5=f04a28e58c681dd5c56e305e1b70a8fc&pid=1-s2.0-S0048969726002639-main.pdf

EVAPOTRANSPIRATION COVER DESIGN OPTIMIZATION – A CASE STUDY

Subotskaya, Y. and L. Breckenridge.
Proceedings from the International Mine Water Association Conference, 7-11 July, Braga, Portugal, and Oviedo, Spain, 7-11 July, 2025

A new evapotranspiration (ET) cover was designed, field-tested, and optimized with computer modeling for the tailings storage facility at the Zangazeur Copper-Molybdenum Complex in Kapan, Armenia. Field data collected from ET cover test cells, soil characteristics, and climate data were combined to create a variably saturated groundwater flow model, which simulated the effectiveness of the cover for more than 10 years. The model was validated against the field-observed measurements of moisture. A minimum cover thickness is recommended to prevent

breakthrough. https://www.imwa.info/docs/imwa_2025/IMWA2025_Subotskaya_897.pdf

THE EVALUATION OF A PILOT PERVIOUS CONCRETE TREATMENT SYSTEM FOR ACID MINE DRAINAGE TREATMENT

Shabalala, A., M. Ngomane, and N. Khanyile.
Proceedings from the International Mine Water Association Conference, 7-11 July, Braga, Portugal, and Oviedo, Spain, 7-11 July, 2025

A pervious concrete (PERVC) reactive barrier system was designed and evaluated to remediate AMD at an abandoned coal mine site. Following treatment with PERVC, the pH increased from 2.6 to 12. Al, Fe, Zn, Ni, Co, Cu, and Mn were effectively removed from the mine water with efficiency levels of 97% to 100%. PERVC offers alternative technology for contaminated mine waters that can be used for full-scale implementation. https://www.imwa.info/docs/imwa_2025/IMWA2025_Shabalala_880.pdf

PERFORMANCE OF PILOT-SCALE PASSIVE TREATMENT TESTS OF A CONTACT OXIDATION MANGANESE-OXIDIZING BACTERIA FOR MANGANESE-CONTAINING MINE WATER

Semoto, Y., T. Hamai, Y. Masaki, M. Ikeda, M. Okumura, N. Miyata, T. Yasutaka, and T. Katayama. Proceedings from the International Mine Water Association Conference, 7-11 July, Braga, Portugal, and Oviedo, Spain, 7-11 July, 2025

A pilot study evaluated the performance of a pilot-scale passive treatment system consisting of a limestone bioreactor and a fiber filter material bioreactor in series and employing a contact oxidation method utilizing Mn-oxidation bacteria for neutral mine water containing Mn and Zn over approximately one year of operation. In the limestone bioreactor, the maximum Mn removal rate reached 49.7 g/m³/day under aeration at water temperatures of ~20°C. Even under low water temperatures of around 5°C, the average Mn removal rate of the system reached 5.65 g/m³//day at a hydraulic retention time of 3 days in a limestone bioreactor. https://www.imwa.info/docs/imwa_2025/IMWA2025_Semoto_874.pdf

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Research

SOURCE APPORTIONMENT OF LEAD IN THE SAN JUAN WATERSHED (USA): INFLUENCES FROM WEATHERING OF MINERALIZED AND SEDIMENTARY DEPOSITS

Wilkin, R.T., M.R. Noerpel, M. Rovero, L. Costantino, I. Bowen, and C. Larrick.
ACS Environmental Au 5:583-593(2025)

A study examined the sources and distribution of Pb within the San Juan watershed in southwestern Colorado and the Four Corners region (Colorado, New Mexico, Arizona, and Utah). Samples collected from 2018 to 2021 included seeps and springs located within the mineralized headwaters region, surface water, and sediments along an ~570 km stretch of riverbed. Concentrations and isotopic compositions of Pb showed that source attribution using stable Pb isotope ratios ($^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$, and $^{208}Pb/^{204}Pb$) facilitated analysis of metal dilution and changing Pb sources. In upstream reaches, Pb from landscape disturbance related to mining operations and weathering of mineralized geologic units represented the most significant Pb source, accounting for as much as 90% of the Pb within upper Animas River sediments. Pb attributed to the mining-impacted headwaters decreased downstream through the Animas River and San Juan River and represented up to about 50% of the Pb in downstream sediments. The proportion and mass of Pb derived from the mining district were reduced in downstream areas due to increased sediment delivery to the central river channels from tributaries and weathering of Paleozoic- to Tertiary-aged sedimentary deposits. Analysis demonstrates that Pb isotope ratios can be used to effectively trace Pb transport through watershed systems where multiple Pb sources exist and where Pb concentrations may be similar to geogenic values. Results indicate that the spatial and temporal variation of Pb isotopic signatures is associated with multiple contributions from natural sources, which are influenced by seasonality and hydrological factors.
https://pubs.acs.org/doi/pdf/10.1021/acsenvironau.5c00070?ref=article_openPDF

FACTORS INFLUENCING WATER QUALITY IN SURFACE WATER AND ALLUVIAL GROUNDWATERS DOWNGRADIENT OF A RECLAIMED SURFACE COAL MINE IN THE POWDER RIVER BASIN OF SOUTHEASTERN MONTANA, USA

Keeshin, S.I., S.A. Ewing, E.B. Meredith, R.A. Payn, and A. Hunt.
Hydrogeology Journal 33:715-737(2025)

Geochemical trends in water quality were evaluated downgradient of a fully reclaimed landscape at the former Big Sky Mine in the Rosebud Creek watershed over 3 years, including bond release in 2022. Within 6 km downgradient from the reclaimed area, sulfate concentrations decreased from ~3,500 to 1,800 mg/L within the Miller Coulee alluvial aquifer. Major ions, δ34SSO4 values, and residence time tracers suggest that the observed decreases in sulfate concentration result from a combination of dilution by mixed-age inflows and incomplete transit of the high salinity plume from the mine boundary. Bedrock and alluvial aquifers of the Rosebud Creek corridor contained contributions of millennia-old regional groundwater, which may serve to mitigate mine-derived high-salinity waters. Rosebud Creek, which traverses the outflow zone of Miller Coulee in the study area, exhibited high sulfate concentrations during low flows and consistent downgradient increases in sulfate concentration. The possibility of plume dynamics in Miller Coulee suggests that the greatest water quality impacts may not yet have reached Rosebud Creek.
This article is ***Open Access*** *at* https://link.springer.com/article/10.1007/s10040-025-02898-z

PHYTOREMEDIATION STRATEGIES FOR THE RECLAMATION OF TAILINGS AND MINING SOILS IN AN ACTIVE OPEN-PIT SITE

Diaz, A.M., R. Forjan, J.L.R. Gallego, L. Benavente-Hidalgo, A. Sanchez-Poyal, P. Diaz-Garcia, J.M. Menendez-Aguado and D. Baragano.
Environmental Research 275:121464(2025)

Two phytoremediation strategies were evaluated at an active open-pit mining site within a dunite deposit, an ultramafic igneous rock rich in nickel. Strategies included phytostabilization for tailings and phytoextraction for mining soil, composed of natural soil aggregates mixed with fine dunite fragments. Tailings had an alkaline pH (8.8), low organic matter content (9.4 g/kg), and high available Ni concentrations, requiring immobilization using compost, vermicompost, biochar, and vermichar. Amendments were tested in 1-kg pots over 180 days, assessing soil properties, plant growth, and Ni accumulation in *Lolium perenne* L. Mining soil showing a more neutral pH (7.6), higher organic matter (106 g/kg), and high available Ni contents underwent phytoextraction supported by EDTA and citric acid in a parallel experiment. Phytostabilization with compost, vermicompost, and vermichar significantly reduced available Ni (Lolium perenne L. functioning either as a metal accumulator or a phytostabilizing plant depending on the amendments used.
https://www.sciencedirect.com/science/article/pii/S0013935125007157/pdfft?md5=0d1c4144fcf31a18f4d03b4a7e8b125f&pid=1-s2.0-S0013935125007157-main.pdf

ASSESSMENT OF BIOCHAR, COMPOST, AND IRON AMENDMENTS TO ENHANCE THE PHYTOSTABILISATION OF ARSENIC IN GOLD MINE WASTE BY THE AUSTRALIAN NATIVE PLANT SPECIES *POA LABILLARDIERI* (STEUD.)

Besedin, J.A., L.S. Khudur, D.A. Besedin, P. Netherway, A.L. Juhasz, A. Batra, F. Huslina, S.K. Biek, G. Aguilar, and A.S. Ball. Chemosphere 391:144728(2025)

A greenhouse mesocosm experiment was conducted for 100 days to optimize phytostabilization using *P. labillardieri* with soil amendments, 5% biochar, 5% compost, and 1% ferric oxide (Fe_2O_3), applied individually or in combination. The combined treatment of 5% biochar and 5% compost (BC) significantly ($p \leq 0.01$) increased root As concentrations (657 ± 135 mg/kg) compared to the unamended control (317 ± 12 mg/kg). Shoot As concentrations ranged between 30 and 44 mg/kg for all treatments. The BC treatment increased soil-to-root bioaccumulation to 0.97, 1 being optimal for phytostabilisation. Soil As concentrations significantly decreased (677 ± 21.5 mg/kg) compared to the unamended control (781 ± 6.32 mg/kg). In addition, As removal from soil improved from 6.83 ± 5.93 to 50 ± 24 mg/m² and *in vitro* bioaccessibility decreased from 47.0 ± 6.92 to 35.8 ± 0.72%. The BC treatment had greater root (0.01 ± 0.01 g), shoot (0.05 ± 0.02 g), and total biomass (0.06 ± 0.03 g), compared to the control (0.004 ± 0.002 g root biomass; 0.01 ± 0.01 g shoot biomass; 0.014 ± 0.012 g total biomass). The BC treatment shows potential to assist phytostabilisation using *P. labillardieri*. A field trial is recommended using the newly developed phytostabilization technique to validate the results under natural climatic conditions.

EVALUATION OF BOREAL PLANT AND MICROBE COMMUNITIES ON TAILINGS SOLVENT RECOVERY UNIT (TSRU) TAILINGS: A MESO-SCALE GREENHOUSE STUDY

Degenhardt, D., A. Van Dongen, A.-l. Balaberda, D.A. Escolastico-Ortiz, and C. Martineau.
Chemosphere 387:144662(2025)

A study evaluated the ability of Tailings Solvent Recovery Unit (TSRU) tailings to support upland and wetland vegetation under various thin capping designs using peat mineral soil mix (PMM) and coarse sand tailings (CST). A 30 cm PMM cover cap successfully supported upland and wetland vegetation for three years, while a thicker, multi-layer cap of 30 cm PMM above 20 cm of CST further improved plant survival and growth. The cap was found to effectively act as a barrier, protecting vegetation from the adverse effects of pyrite oxidation in the TSRU tailings. While the TSRU tailings acidified (pH ≤ 2) under all capping treatments, the thickest cap (30 cm PMM/20 cm CST) delayed acidification by one year. TSRU and CST had low microbial biomass and diversity, with bacterial communities mostly composed of sulfur oxidizers and acidophilic taxa. In contrast, the PMM layer maintained a higher microbial biomass, diversity, and stability across all treatments, highlighting its potential to enhance plant-microbe interactions and improve the reclamation success of TSRU tailings.
https://www.sciencedirect.com/science/article/pii/S0045653525006101/pdfft?md5=e1a1ae4715a1549a7f84720ff3f5669c&pid=1-s2.0-S0045653525006101-main.pdf

DEPTH-DEPENDENT HETEROGENEITY IN TOPSOIL STOCKPILES INFLUENCES PLANT-MICROBE INTERACTIONS AND REVEGETATION SUCCESS IN ARID MINE RECLAMATION

Murawska-Wlodarczyk, K., P. Kushwaha, O. Stokes, C. Rasmussen, J.W. Neilson, R.M. Maier and A. Babst-Kostecka. Science of The Total Environment 1003:180673(2025)

A study evaluated soil health parameters within the 28-meter depth profile of a 14-year-old copper mine topsoil stockpile to identify key indicators of revegetation success in a semi-arid ecosystem. Plant growth was monitored using non-invasive root phenotyping in rhizoboxes filled with soils collected from different depth layers, allowing assessment of how biochemical variability in stockpiled materials influences germination and early establishment. Machine learning models integrating soil properties, plant responses, and sequenced soil bacterial/archaeal and fungal DNA identified key indicators influencing plant performance. Results revealed significant heterogeneity in soil quality across depths, with distinct biochemical and microbial profiles shaping vegetation establishment. The upper 10 m exhibited greater potential for supporting growth, with seedling survival reaching 95%, whereas deeper layers showed drastically reduced survival, sometimes as low as 0%, due to microbial shifts to anoxic conditions and elevated Fe and Mn toxicity. Fungal communities played a dominant role in germination, while archaea were more influential during later plant establishment. Soil parameter comparisons before and after the experiment indicated recovery processes initiated by plant-soil feedback, including fungal community renewal. Findings highlight the role of stockpile formation in preserving soil health attributes critical for ecological recovery and provide practical insights for optimizing land reclamation in semi-arid ecosystems. https://www.sciencedirect.com/science/article/pii/S0048969725023137/pdfft?md5=bb42e8e16ab1043283ec6bc06042c0d5&pid=1-s2.0-S0048969725023137-main.pdf

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General News

PROACTIVE MINE POOL MANAGEMENT: IMPLEMENTING A REMOTE TELEMETRY MONITORING NETWORK IN PENNSYLVANIA'S BITUMINOUS DISTRICT

May, S. 27th Annual PA AMR Conference, 14-16 October, State College, PA, 43 minutes, 2025

Pennsylvania's Department of Environmental Protection's Bureau of Abandoned Mine Reclamation is initiating a long-term monitoring program to address the challenges posed by deep mine pools in the bituminous district. The mine pools, remnants of extensive historical coal mining, present significant risks of blowouts, subsidence, and other adverse environmental impacts if left unmanaged. An innovative network of monitoring wells equipped with remote telemetry systems is being established to enhance proactive readiness and improve mitigation strategies. The technology will provide real-time data on water levels, pressure changes, and other critical parameters, enabling immediate response to fluctuations indicative of potential hazards. The program aims to develop a robust dataset to predict trends and model behaviors within the interconnected mine pool systems. By integrating these monitoring efforts with geospatial analysis and predictive modeling, the initiative seeks to bolster the state's ability to anticipate and prevent catastrophic events. The presentation outlines the program's design, early implementation steps, and the broader implications for mine pool management. Attendees gained insights into leveraging advanced telemetry for sustainable reclamation practices and enhancing community and environmental resilience in areas impacted by legacy mining activities. https://www.youtube.com/watch?v=xjje3m0Sbb8

WASTE GAS CAPTURE FROM ABANDONED MINES

Bobsein, B. 27th Annual PA AMR Conference, 14-16 October, State College, PA, 47 minutes, 2025

Mines vent methane out of the workings for safety purposes, but little is being done to capture this resource and utilize it. Today, waste methane from mines is predominantly being vented as a potent greenhouse gas, continuing for decades after a mine has been inactivated or abandoned. This energy source can be harnessed while furthering economic development in Pennsylvania, and in other industrial communities across the U.S. A project was pioneered to capture waste methane from abandoned mines and bring it to market as Remediated Mine Gas (RMG), one of just three such RMG operations in the U.S. EPA identified over 60 RMG project opportunities from abandoned mines, which could lead to thousands of jobs and billions of dollars in economic output. If leveraged correctly, RMG projects can lead to additional energy infrastructure being built out, getting reliably dispatchable fuel to market, improving grid resilience, lowering greenhouse gas emissions, and driving manufacturing and AI investment to these underserved areas. https://www.youtube.com/watch?v=pLZW9XXA2QM

DISPERSED ALKALINE SUBSTRATE PASSIVE TREATMENT TECHNOLOGY FOR HIGHLY CONTAMINATED ACID MINE DRAINAGE: 20 YEARS OF SUCCESSFUL APPLICATION

Leon, R., R. Millan-Becerro, F. Macias, C.R. Canovas, C.M. Neculita, C. Ayora and J.M. Nieto. Water Research 288(Part B):124683(2026)

Over the past two decades, Dispersed Alkaline Substrate technology (DAS) has emerged as a highly effective passive approach to treating acid mine drainage with extreme acidity and metal loading. DAS systems maintain high porosity and neutralization capacity without rapidly clogging by mixing alkaline materials (limestone, magnesia, barium carbonate, or industrial by-products) into an inert wood-chip matrix. The technology evolved from lab trials to pilot and full-scale field testing, using multi-step systems integrated with Natural Fe-Oxidizing Lagoons (NFOL) for pre-oxidation, which have demonstrated their long-term effectiveness for acidity and metal removal. The sustainability and applicability of the process have been improved by the search for new reagents (e.g., MgO for divalent metals removal, $BaCO_3$ for sulfate removal, wood ash or calcite-rich waste for cost reduction). Field trials in diverse regions, from the Iberian pyrite belt to South Africa, Canada, South America, Asia, Europe, and Oceania, report net acid removal often exceeding 95% and near complete retention of metal(loid)s such as Al, Cu, Zn, Pb, and As. Mineralogical analyses indicate that contaminants precipitate primarily as hydroxides, oxyhydroxides, and sulfates (e.g., schwertmannite, basaluminite, barite), allowing targeted valorization of metal-rich sludges. Remaining challenges include assessing long-term reagent life under variable hydrological conditions, extending full-scale use to phosphogypsum and other industrial leachates, and developing strategies for residue stabilization and resource recovery. This review aims to synthesize these developments, assess current performance, and identify future research needs for the advancement of passive DAS treatment technology.

COMPREHENSIVE UTILIZATION OF IRON ORE TAILINGS: A REVIEW OF SUSTAINABLE PRACTICES AND TECHNOLOGIES

Wu, W., K. Kang, Q. Ye, A. Luo, J. Zhang, J. Wang, and S. Shi.
Mining, Metallurgy & Exploration 43:413-430(2026)

This paper reviews the physicochemical properties of iron ore tailings (IOT), analyzes the environmental hazards associated with their accumulation, and summarizes recent advancements in their comprehensive utilization, including recovering valuable elements, preparing backfill materials, developing construction materials, synthesizing soil conditioners, and producing chemical materials such as adsorbents and catalysts. Despite the promising pathways, the transition from lab research to industrial application faces challenges related to economic viability, process standardization, and long-term environmental safety. Future research should focus on developing low-cost activation technologies, enhancing the long-term durability and eco-efficiency of IOT-derived products, and integrating policy-driven incentives to promote market adoption. The review aims to provide a scientific basis and strategic reference for the high-value, sustainable utilization of IOT in the context of a circular economy.

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 and Emergency Management at adam.michael@epa.gov or (703) 399-4268 with any comments, suggestions, or corrections.

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