Entries for November 16-30, 2024

Market/Commercialization Information

F -- FORMOSA MINE SUPERFUND SITE OPERABLE UNIT 1 REMEDIAL ACTION CAPPING PROJECT (SRCSGT)

U.S. Army Corps of Engineers (USACE), Northwest Division, Seattle District, Seattle, WA
Contract Opportunities on SAM.gov W912DW-25-R-0008_ss, 2024

This is a sources sought notice for marketing research purposes only. The USACE Seattle District seeks responses from industry to identify capable large and small businesses under NAICS code 562910. The Formosa Mine Superfund site is an abandoned mine in Douglas County, Oregon. The project's scope of work includes activities necessary to implement earthwork-related requirements of the EPA's RoD for the Formosa Mine Superfund site OU 1. OU1 includes all surface and subsurface mine materials deposited outside of the underground mine workings considered "source materials" for the site, including materials excavated during the mine's construction and operation (waste rock, ore, tailings, construction rock, road surfaces, and contaminated soils). The objectives of the OU1 remedial action are to remove, consolidate, and restrict or minimize the interaction of contaminant source materials with precipitation, surface water runoff, and groundwater, focusing on preventing direct exposure to mine waste with elevated concentrations of metals and reducing acid rock drainage generation, reducing impacts to groundwater and surface water. The remedial action includes OU1 mine materials at the encapsulation mound; former ore storage/million-gallon storage tank area; the Formosa Adit 2, Formosa Adit 3, and 1090 Raise waste rock dumps (WRDs); and roads containing mine materials adjacent to these areas. The specific project scope of work includes stabilizing the steep encapsulation mound (EM) slopes with gabion walls; developing a clean materials borrow area and non-primary mine disturbance area (PDMA) mine material repository; grading and consolidating mine materials in the non-PMDA mine material repository; impermeable cover construction on the EM, former ore storage/million-gallon storage tank, and non-PMDA mine material repository; grading, amending, and revegetating mine materials at the area southwest of the EM, and Formosa Adit 2, Formosa Adit 3, and 1090 Raise WRDs; and excavating mine materials from roads, reconstructing roads within the project limits, and constructing a steep slope northwest access road for gabion wall placement. There is no solicitation at this time. Capability packages are due by 1:00 PM PST on January 23, 2025. https://sam.gov/opp/5cd37dc0667c46cca0f2f00503dbae78/view

Z-- IRON KING MINE-HUMBOLDT SMELTER (IKM-HS) ENVIRONMENTAL REMEDIATION IDIQ (SRCSGT)

U.S. Army Corps of Engineers, South Pacific Division, Los Angeles District, Los Angeles, CA
Contract Opportunities on SAM.gov W912PL25S0008, 2024

This is a sources sought notice for marketing research purposes only. The Government seeks to identify both large and small business sources qualified to conduct the remedial action (RA) for the IKM-HS Superfund Site in Dewey-Humboldt, AZ under NAICS code 562910. The RA cleanup includes excavation and removal of contaminated soil exceeding established cleanup levels, disposal of contaminated soil, and restoration at residential and non-residential properties and selected areas at the former mine and smelter properties (Project). The RA will be completed in accordance with the RoD - Iron King Mine-Humboldt Smelter, the Residential Design Plan, and supplemental design information. The Contractor shall comply with all applicable Federal, State, and local laws, and regulations including, but not limited to the 1968 National Oil and Hazardous Substances Pollution Contingency Plan, as amended, and CERCLA, as amended. An Industry Day is planned for January 28, 2025, between 9 AM-3:30 PM to encourage industry participation, allow for networking, answer respondent questions and confirm the project scope. There is no solicitation at this time. Responses to the sources sought questionnaire are due by 2:00 PM PST on February 11, 2025. https://sam.gov/opp/b74df6a2e57c422a806a2c7af79a7319/view

Z -- IRON KING MINE-HUMBOLDT SMELTER (IKM-HS) REMEDIAL ACTION CONSTRUCTION (RAC), INDEFINITE DELIVERY INDEFINITE QUANTITY (IDIQ) (SRCSGT)

U.S. Army Corps of Engineers, South Pacific Division, Los Angeles District, Los Angeles, CA
Contract Opportunities on SAM.gov W912PL25S0009, 2024

This is a sources sought notice for marketing research purposes only. The Government seeks to identify qualified large and small business sources to conduct the remedial action (RA) for the IKM-HS Superfund site in Dewey-Humboldt, AZ, under NAICS code 237990. The ROD selected remedy is Alternative 3B: On-Site Consolidation/Containment at Two Repositories With Waste Remaining East and West of the Highway. The highway is State Route 69, which serves as the main road to Prescott, Arizona, from Arizona Interstate 17. The Construction Contractor will be expected to perform the work described in the ROD as Alternative 3B, including the dam removal, retaining wall construction, creating a cap for the two repositories, and other construction activities as described and/or as needed for the site. Alternative 3B calls for removing mine and smelter wastes and contaminated soils and moving them to two waste repositories. Mine wastes and contaminated soils from the former mine and surrounding areas west of Highway 69 would be moved into a repository on the existing mine tailings pile west of the highway. Mine wastes at the former smelter and in the Chaparral Gulch east of Highway 69 would be moved into a second waste repository east of the highway. Additionally, the Lower Chaparral Gulch Dam east of the highway shall be removed to allow access to waste in the Lower Chaparral Gulch and restore the natural hydraulics and vegetation of the drainage. This shall include watershed and habitat restoration. A specific dam removal plan will be provided to the dam removal contractor. There is an Industry Day planned for January 28, 2025, between 9 AM-3:30 PM to encourage industry participation, allow for networking, answer respondent questions and confirm the project scope. There is no solicitation at this time. Responses to the sources sought questionnaire are due by 2:00 PM PST on February 11, 2025. https://sam.gov/opp/5a0c5df759b34f6e9d760a5f2a6474f5/view

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Cleanup News

FIRST FULL-SCALE APPLICATION OF BARIUM CARBONATE AS AN EFFECTIVE DISPERSED ALKALINE SUBSTRATE FOR SULFATE REMOVAL FROM ACID MINE DRAINAGE

Guerrero, J.L., R. Leon 2, C.R. Canovas, R. Perez-Lopez, J.M. Nieto, and F. Macias.
Science of The Total Environment 955:176877(2024)

A full-scale passive treatment plant using barium carbonate (BaCO3) as a Dispersed Alkaline Substrate (DAS) for strongly contaminated acid mine drainage (AMD) was implemented at Mina Concepcion in the Iberian Pyrite Belt. The plant was monitored for 105 days, covering the wettest months of the hydrological year and with a mean flow of ~4 L/s. The AMD exhibits a high strength, with an average sulfate concentration ~1,500 mg /L and net acidity ~1,000 mg/L as $CaCO_3$ equivalent. The loading rate for SO_4 and Fe was ~400 and 80 kg/day, respectively. The treatment process produced an alkaline effluent with low metal content. Nearly complete removal of most metal(loid)s was achieved, with a significant sulfate decrease to < 500 mg/L in the alkaline outflow of the barium carbonate tank. Barium carbonate demonstrated superior performance compared to magnesia, particularly in enhancing alkalinity and lowering net acidity and concentrations of sulfate and manganese. The high efficiency attained by the plant after the barium carbonate treatment is evidenced by compliance with environmental water quality standards for most contaminants.

SOURCE REDUCTION AND END TREATMENT OF ACID MINE DRAINAGE IN CLOSED COAL MINES OF THE YUDONG RIVER BASIN

Wu, Q., X. Li, Q. Feng, and X. Li. Water Science & Technology 89(2):470-483(2024)

After the closure of the Yudong coal mine, the pH value of the acid mine drainage (AMD) was ~3.0 and the Fe and Mn concentrations reached 380 and 69 mg/L, respectively, causing serious pollution to the water bodies in the nearby watershed. Combined with the formation conditions of AMD, a comprehensive treatment technology of source reduction-end treatment was adopted to treat it. The goaf treatment area was 0.3 km^3, the filling and grouting volume was about 6.7 m^3, and the curtain grouting volume was 4,000 m^3. The water volume was reduced to < 85% of the initial volume (100 m^3/h) through grouting and sealing treatment of the goaf. After the end treatment, the pH value of the effluent was ~7.0, the content of Fe and Mn was < 0.1 mg/L, and the removal rate was >99%. The project was subsequently operated at RMB 0.85 yuan/t. The project aimed to treat AMD from small coal mines in complex terrain

conditions. Results indicate the process can be an effective treatment technology for AMD in southwestern China and areas with the same geological conditions. https://iwaponline.com/wst/article/89/2/470/99789/Source-reduction-and-end-treatment-of-acid-mine

MINING WASTE TO VALUE IN THOMPSON, MANITOBA
Champagne, D. | RemTech 2024: Remediation Technologies Symposium, 16-18 October, Banff, Alberta, Canada, 27 slides, 2024

A large-scale mine site copper pond decommissioning project aimed to reclaim ~72,000 wet short tons (WST) of Cu precipitate from copper ponds at the Thompson Smelter and Refinery site. This presentation describes how the innovative project was developed and executed in the field. Once Cu precipitate is extracted from the pond(s), acidic precipitate is neutralized to appropriate pH levels, then the Cu precipitate is processed into 1,300 kg bulk capacity bags. Once bagged and processed, the final Cu precipitate product is loaded onto freight trucks for offsite transport. The reclamation processes continue to showcase favorable results in higher Cu% assays as precipitate is processed, highlighting a sizeable amount of Cu reclaimed within the final product. These reclamation efforts provide a financial return for a waste product sitting idle in holding ponds and considered an environmental risk and financial liability.
Slides: https://esaa.org/wp-content/uploads/2024/10/RT2024-CHAMPAGNE.pdf
Longer abstract: https://esaa.org/wp-content/uploads/2024/09/RT2024-program-Abstracts-5.pdf

PRELIMINARY DESIGN INVESTIGATION - ADDRESSING KEY DATA GAPS, INCORPORATING INNOVATIVE TECHNOLOGIES, AND OVERCOMING REMOTE CHALLENGES
Snyder, T. | DCHWS West 2024 Fall Symposium, 6-8 November, Denver, CO, 17 slides, 2024

The Nelson Tunnel/Commodore Waste Rock Superfund site is located ~9,175 ft above mean sea level in a canyon with steep, nearly vertical walls reaching roughly 10,600 ft. EPA selected an interim remedy to prevent a catastrophic release from mine pools impounded by roof fall blockages in Nelson Tunnel that included the installation of a new mine adit or tunnel that intersects Nelson Tunnel to bypass the 1 million gal (MG) Nelson Tunnel Portal Pool; rehabilitation of the Nelson Tunnel from the bypass adit connection to the bulkhead target zone; installation of a flow control bulkhead in the Nelson Tunnel to reduce the likelihood of a sudden and large release through the Nelson Tunnel; and installation of an accessible flow control structure in the Commodore 5 level to reduce the likelihood of a sudden, large release if water is impounded to this level. The design and implementation of the remedy needed to consider a number of project management and technical challenges, including a remote canyon location, tourist season limiting construction schedules, and the challenges associated with designing a remedy to prevent an uncontrolled release of 22 MG of impounded mine-influenced water in the Nelson Tunnel. The key preliminary design investigation activities included a geotechnical investigation focused on a 1,300-ft horizontal boring to better understand geotechnical conditions in the proposed bypass adit location and target the bulkhead location; a subsurface survey to collect information within the Nelson Tunnel to address unknowns and provide better information to site the bulkhead location; and an electrocoagulation pilot study to inform system operation, water treatment efficiency, and provide critical information for the design.
https://mediacdn.guidebook.com/upload/213715/lLYxsUVqBpIDZLGUh5PHX0KwC6yTtxp9GxPN.pdf

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Demonstrations / Feasibility Studies

DEVELOPMENT OF A SINGLE STAGE HIGH DENSITY SLUDGE (HDS) PROCESS FOR THE REOPENING OF SOUTH CROFTY TIN MINE, CORNWALL, UK
Morgan, R., R. Coulton, S. Kingstone, and N. Watson. | Proceedings of the West Virginia Mine Drainage Task Force Symposium and 15th International Mine Water Association Congress, 22-26 April, 6 pp, 2024

This paper overviews the pilot plant trials undertaken at the South Crofty Tin Mine. Results led to designing and installing a full-scale water treatment plant, which allowed the mine to reopen. The single-stage high-density sludge plant used hydrogen peroxide to oxidize and precipitate an arsenic-rich iron sludge. Iron/arsenic oxidation and precipitation occurred at a near-constant pH by concurrently air-stripping dissolved carbon dioxide and utilizing the carbon buffer in the mine water, thereby avoiding the addition of alkali. After removing the iron/arsenic sludge, the pH was raised to circa pH 10 using a second single-stage high-density sludge plant to remove manganese. The paper includes a comparison of the pilot and actual plant performance.
Paper: https://www.imwa.info/docs/imwa_2024/IMWA2024_Morgan_452.pdf
Slides:https://wvmdtaskforce.com/wp-content/uploads/2024/05/tuesday-a-100-morgan.pdf

A PILOT-SCALE STUDY ON THE IN-SITU REMEDIATION OF ACID MINE DRAINAGE WITH SUPPLEMENTAL OF EXTERNAL NUTRITION: PERFORMANCE, HEAVY METAL REMOVAL AND MICROBIAL COMMUNITY EVOLUTION
Ma, D., J. Wang, L. Wang, S. Wang, X. He, and Z. Yue.
Journal of Environmental Chemical Engineering 12(5):113373(2024)

A pilot scale reactor was set up next to an acid reservoir to evaluate the effect of livestock wastes on the in situ bioremediation of AMD, focusing on performance assessment, heavy metal removal efficacy, and the evolution of the microbial community. Results indicated that the pH of AMD rose rapidly from 3.23 to 4.11, and metals (e.g., Fe, Cu, and Zn) were rapidly removed in Stage I. However, AMD experienced significant stratification in Stage (biogas slurry supplemented). The pH of the surface layer (0.5 m bgs) gradually dropped to 3.67, the bottom layer (2.3 m bgs) remained ~ 4.1, and the metal removal efficiencies further improved. Fe-OB and Fe-RB dominated microbial communities in the surface layer, while SRB dominated in the bottom layer. The addition of biogas slurry significantly increased the relative abundance of functional microbes in bioremediation. The growth of SRB at the bottom of the reactor contributed to the removal of heavy metals, mainly through insoluble hydroxide formation and sulfide precipitation and co-precipitation. The study innovatively integrates low-cost, locally sourced livestock waste as nutrient supplements into AMD bioremediation processes and demonstrates the potential for integrating AMD treatment with livestock waste management, addressing both the nutrient needs for AMD processing and the challenge of livestock waste disposal.

IN SITU USE OF MINING SUBSTRATES FOR WETLAND CONSTRUCTION: RESULTS OF A PILOT EXPERIMENT
Hernandez-Perez, C., S. Martinez-Lopez, M.J. Martinez-Sanchez, L.B. Martinez-Martinez, M.L. Garcia-Lorenzo, and C.P. Sirvent. | Plants 13(8):1161(2024)

An experimental wetland was evaluated as part of a pilot soil reclamation project in a mining area. The wetland was constructed using mining materials from the area; most reactive materials of acid pH were stabilized using limestone filler. The macrophytes *Phragmites australis*, *Juncus effusus*, and *Iris pseudacorus*, tolerant to potentially toxic elements (PTEs) and resistant to salinity, were selected for the study. The macrophytes were placed in pots containing substrates composed of different mixtures of topsoil, peat, and mining waste (black or yellow sand). PTE mobilization studies were included in a thorough analysis of the physicochemical and mineralogical characteristics of the materials. This study emphasizes the significance of the rhizosphere in directing the transfer of PTEs to the plant and the correlation between the substrate and the development of plant defense mechanisms, such as Fe-plate formation. Scanning electron microscopy was used to highlight these aspects and validate the results of the analytical determinations. The wetlands can be proposed as a phytoremediation strategy for areas affected by mining and maritime influence. They are easy to construct and remain stable, providing important ecosystem services such as the natural attenuation of acid mine drainage, support for vegetation development and fauna, and a clean ecosystem.
https://www.mdpi.com/2223-7747/13/8/1161

AMENDMENTS PROMOTE DOUGLAS-FIR SURVIVAL ON FORMOSA MINE TAILINGS
Johnson, M.G., D. Olszyk, M. Bollman, M.J. Storm, R.A. Coulombe, M. Nash, V. Manning, K. Trippe, D. Watts, and J. Novak. | Journal of Environmental Quality 53(5):553-564(2024)

This article describes a case study at the Formosa Mine in Douglas County, Oregon, where tailings were amended with a mixture of lime, biosolids, biochar, and microbial inoculum to facilitate establishment of Douglas-fir (*Pseudotsuga menziesii* [Mirbel] Franco) seedlings. The tailings pH increased, and Douglas-fir seedlings survived and grew with the amendments. After two years, pH decreased in some downslope locations and was associated with increased tree mortality. This suggests that tailings conditions should be monitored and amendments reapplied as needed, particularly in areas receiving acidic runoff from unamended upslope tailings until the seedlings are fully established. This study provides a prescription for the addition of biochar and other amendments to enhance plant growth for revegetation purposes in low-pH, metal-contaminated mine tailings and demonstrates a method that can be used to address similar problems at other mine sites.

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Research

A TOOLBOX FOR CHARACTERIZING ORGANIC MEDIA IN PASSIVE BIOTREATMENT CELLS

Schultz, L., B. Park, L. Stanford, K. Pfeifer, I. Montero, S. Riese, A. Wing, and T. Moore.

Proceedings of the West Virginia Mine Drainage Task Force Symposium and 15th International Mine Water Association Congress, 22-26 April, 2 pp, 2024 This paper describes the analysis of organic media containing wood chips and shavings, steer manure, and alfalfa hay collected from sulfate-reducing bioreactors that operated for nearly a decade in southwest Colorado. A broad toolbox of techniques was developed to characterize and compare the used media to the initial media stored in a controlled temperature environment. A method was developed to preserve and isolate inorganic surface fines from organic media, and standard techniques showed the spatial distribution of metals and nutrients. Sequential extractions using organic solvents were performed to characterize the lignocellulosic components and availability of carbon forms. A modified Tessier sequential extraction method was used to quantify weakly adsorbed metals and metals associated with iron and manganese oxides, carbonates, sulfides, and organic material. Scanning electron microscopy and energy-dispersive X-ray spectroscopy were used to visualize shapes and elemental distributions on the media surfaces. Leachate tests, including the synthetic precipitate and toxicity characteristic leaching procedure, provided insight into potential metal mobility during precipitation or leaching in the environment during storage. Results highlighted trends with depth below the media surface in down-flow reactors. Media samples were removed and exposed to air/oxidation for up to 90 days to inform storage and disposal methods. For some metals, leachability increased over storage time, while for other metals, leachability decreased. The results and lessons describe a unique situation of water and media type, environmental conditions, and reactor design; however, this toolbox of techniques can be similarly applied to any passive bioreactor that treats mining-influenced water.
Paper: https://www.imwa.info/docs/imwa_2024/IMWA2024_Schultz_571.pdf
Slides: https://wvmdtaskforce.com/wp-content/uploads/2024/05/tuesday-d-310-schultz.pdf

REMEDIATION ON ANTIMONY-CONTAMINATED SOIL FROM MINE AREA USING ZERO-VALENT-IRON DOPED BIOCHAR AND THEIR EFFECT ON THE BIOAVAILABILITY OF ANTIMONY

Ji, J., Y. Mu, S. Ma, S. Xu, and X. Mu. | Chemosphere 363:143015(2024)

A study researched the immobilized performance of biochar (BC) loaded with nano zero-valent iron (nZVI-BC) on antimony in soil near a smelting area through pot experiments and investigated its stabilization mechanism via the variation of the element's valent state. BC restricted the cation exchange capacity and catalase activity in the soil, while nZVI-BC had a favorable and negative impact on two variables, respectively. The nZVI-BC showed more stable immobilization capacity on antimony over time than BC, whose exchangeable speciation only marginally increased (2%-6%). However, the exchangeable speciation of antimony decreased from 15% to 2% after adding the BC and nZVI-BC. The electron attraction force between nZVI-BC and antimony was also intensified owing to the oxidation-reduction process, which was considered the stabilizing principle of nZVI-BC on antimony in soil. The decreased bioaccumulation factor for the perennial ryegrass (0.46-0.21) and *Galinsoga parviflora* Cav. (0.26-0.17) showed that the BC effectively mitigated the bioaccumulation risk of antimony.

DENDROREMEDIATION OF SOIL CONTAMINATED BY MINING SLUDGE: A THREE-YEAR STUDY ON THE POTENTIAL OF *TILIA CORDATA* AND *QUERCUS ROBUR* IN REMEDIATION OF MULTI-ELEMENT POLLUTION

Budzyńska, S., K. Rudnicki, A. Budka, P. Niedzielski, and M. Mleczek.
Science of The Total Environment 944:173941(2024)

A study aimed to assess the long-term growth, element accumulation and proline content in 2-year-old *Tilia cordata* Mill. and *Quercus robur* L. seedlings growing under extremely polluted mining sludge (MS) (1 and 3%) after 1, 2, and 3 years. Both species grew efficiently without significant differences resulting from MS impact. The overall rise was higher for *T. cordata* than for *Q. robur*. The accumulation ability for As, Hg, In, Mn, Mo, Pb, Ti, and Zn in the whole plant was significantly higher for *T. cordata*, while Cd, Sb, Sn and Tl did not differ considerably between species. The highest content was found for As, Mn, and Zn (68.7, 158, and 157 mg/plant, respectively) for *T. cordata* after 3 years. The calculated bioconcentration factors were the highest for Cu (1.23), In (6.86), and Zn (38.4) for *Q. robur*, as well as for As (1.55), Hg (3.24), Mn (32.8), Mo (1.64) and Ti (18.0) for *T. cordata* after 3 years. The highest translocation factors were observed for In (1.35) and Sn (1.25) after 3 years and for Mn (2.72, 3.38, and 3.03 after 1, 2, and 3 years) for *Q. robur* seedlings. The proline content was higher for *Q. robur*, regardless of which organ was examined, and the differences increased with the time of the experiment and the amount of MS addition (possibly more sensitive to stress). Young *T. cordata* seedlings show much greater potential than *Q. robur*.

INTEGRATING PORTABLE X-RAY FLUORESCENCE SITE SURVEY AND ARCGIS MODELS FOR RAPID RISK ASSESSMENT AND MITIGATION STRATEGIES AT AN ABANDONED ARSENIC MINE SITE: A CASE STUDY

Wang, L., D. Lamb, Z. Dong, P. Sanderson, J. Du, and R. Naidu.
Environmental Technology [Published 15 May 2024 before print]

A state-of-the-art handheld XRF technology was utilized to conduct a real-time assessment of the Mole River arsenic mine site. The data revealed elevated levels of arsenic and manganese, identifying the southeast corner as a contaminant hotspot. A tiered risk assessment approach was used to compare the contaminant concentrations to the Australian health investigation levels (tier 1), leading to a broader examination of erosion vulnerabilities and the potential migration of contaminants (tier 2). A hydrological assessment (tier 3) identified significant erosion in southern regions, indicating the potential for contaminants to be transported offsite through surface water runoff to Sam's Creek and Mole River. A reservoir near the runoff pathways brought additional challenges, especially during heavy rainfall events. Subsequent water sample analysis reinforced findings, confirming heightened arsenic concentrations in Mole River downstream, accentuating the potential risks to ecosystems and human health. Integrating the XRF contour map and erosion assessment with the RUSLE model provided valuable insights into critical hotspots with high contamination and erosion potential. Resources can be allocated more efficiently and cost-effectively by directing rehabilitation efforts towards critical hotspots.
https://www.tandfonline.com/doi/epdf/10.1080/09593330.2024.2354121?needAccess=true

REMEDIATION OF AMD BASED ON HYDROGEOCHEMICAL ZONATION: A TYPICAL METAL MINE IN CHINA

Tang, J., X. Liu, B. Li, Y. Nie, X. Gao, M. Gao, and G. Liu.
Science of The Total Environment 950:175053(2024)

Fifteen water samples from flood and dry periods and fifteen borehole samples were collected for hydrogeological and chemical analysis to clarify the distribution of the underground redox environment after mining a metal mine in Dexing, China. The study proposed that the redox zone could be identified and delineated through vertical analysis of water storage media, mineral composition, and hydrochemical characteristics. A hydrogeochemical cause model revealed that AMD formation primarily occurs in oxidative and transition zones. Based on the redox zone characteristics of the study area, actual engineering sealing was performed on the oxidation and transition zones of cavity No. 23. As a result, the pH increased from 2.5 to 4.5, indicating a reduction in acidity. SO_4^{2-} and Fe concentrations significantly decreased, from 1,360 mg/L and 147 mg/L to 726 mg/L and 23.6 mg/L; the total decrease amounted to 46.6% and 84%, respectively. Similarly, the concentrations of Mn and Cu decreased by 10.7% and 15.6%, respectively.

BACKGROUND GROSS GAMMA EXPOSURE RATES, POST REMEDIATION FINAL STATUS SURVEY SAMPLING DENSITY, AND RADIOLOGICAL WATER QUALITY MODELING FOR A WORST-CASE CATASTROPHIC FAILURE, COLES HILL, VIRGINIA

Weyant. D.B. and J. Yoon. | Health Physics 127(3):392-403(2024)

Statistical modeling techniques based on a completely randomized experimental design were used to analyze exposure rate measurements to evaluate hypothetical natural background levels following uranium milling operations at Coles Hill. The proposed mine is situated upstream of the Banister River,

which is nearly homogenous throughout the reach length used in the analysis. It feeds into the mouth of Kerr Reservoir, Lake Gaston, which serves as the main drinking water source for cities in the Hampton Roads area, including Norfolk, Virginia Beach, and Chesapeake. A critical scan value was developed to flag anomalies of surface contamination during simulated post-remediation final status surveys. The natural background was critical for meeting MARSSIM guidance for post-remediation final status surveys. The overarching null hypothesis suggested that the selected mean natural background is equal to the survey unit's mean natural background. The SAS Procedures Shapiro-Wilk Test, ANOVA, and CR determined that the exposure rate data was normal, had no extreme outliers, and no collinearity between the number of samples and the areas. Using the q-hyper (hypergeometric) distribution, the soil sampling density was decided for a final status survey unit. The most likely worst-case catastrophic failure analysis, 500-year event was included in the model. The model showed that the impact was minimal at most to the Banister River's drinking water and likely less than Virginia's Drinking Water Standards for gross alpha, ^{226}Ra and ^{228}Ra, and total U.

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General News

NEW USGS DATA-DRIVEN TOOLS CAN AID RESTORATION OF MINE LANDS ACROSS AMERICA

Weukkm A,m and D. Jones. USGS website, September 26, 2024

USGS released a web mapping application, a data catalog, and an informational report to aid resource managers in the assessment and restoration of mine lands. These lands can pose environmental hazards and safety risks to humans and wildlife, but there is a lack of information on the whereabouts of mining activities and their potential environmental effects. The three new products help address this information gap by providing a suite of complementary tools and information that make it easier to assess and track mining activity, monitor mine land conditions and plan restoration and reclamation projects. These include:

- Mine lands web mapping tool: This interactive, customizable web map allows users to visualize geospatial data to support the assessment and management of mine lands. Users can overlay mine lands and mine-related features with other landscape characteristics. Users can also generate custom data summaries for user-defined areas of interest. In its initial version, the application gives users a quick summary of mine features. Additional data and capabilities will be added to the tool in future releases.
- Mine lands data catalog: This web portal provides a central catalog of geospatial data resources related to mines and minerals, population demographics, geology and soils, habitats, land management status, and topography. Users can filter datasets by keywords, geographic extent, and other characteristics and locate relevant documentation and data linkages. The catalog makes it easier to locate mine-related data, providing centralized access and useful filtering tools to identify data resources most aligned with user's needs.
- Synthesis report on remote sensing to monitor mine lands: Remote sensing primarily uses satellite or aircraft-based imagery to generate large-scale information about the Earth. In this report, researchers describe how remote sensing can assess and monitor mine lands, illustrating remote-sensing approaches using a set of case studies.

Website:
https://www.usgs.gov/news/national-news-release/new-usgs-data-driven-tools-can-aid-restoration-mine-lands-across-america#science
Mapping tool: https://minelands.fort.usgs.gov/#zoom=5/center=36.83,-104.74/layers=id:layer5section0;id:layer0basemaps
Data catalog: https://rconnect.usgs.gov/bildatacatalog/
Remote sensing report: https://pubs.usgs.gov/circ/1525/cir1525.pdf

POST-MINING ECOSYSTEM RECONSTRUCTION

Tibbett, M. Current Biology 34(9): R387-R393(2024)

This article discusses the complex factors that need to be considered in ecosystem reconstruction after mining and outlines approaches for optimizing land rehabilitation outcomes.

A COMBINED BIBLIOMETRIC AND SUSTAINABLE APPROACH OF PHYTOSTABILIZATION TOWARDS ECO-RESTORATION OF COAL MINE OVERBURDEN DUMPS

Bashir, Z., D. Raj, and R. Selvasembian. | Chemosphere 363:142774(2024)

A systematic bibliometric analysis was conducted to identify research trends and gaps and evaluate the impact of studies and authors on coal overburden (OB) phytostabilization. Applicable case studies of successful phytostabilization at coal mines using native plants offer practical recommendations for selecting species in reclamation projects. The review contributes to sustainable approaches for mitigating the environmental consequences of coal mining and facilitates the ecological recovery of degraded landscapes.

A REVIEW OF PASSIVE ACID MINE DRAINAGE TREATMENT BY PRB AND LPB: FROM DESIGN, TESTING, TO CONSTRUCTION

Wang, Y., C. Wang, R. Feng, Y. Li, Z. Zhang, and S. Guo.
Environmental Research 251(Part 1):118545(2024)

A study evaluated permeable reactive barrier systems utilized to remediate acid mine drainage and introduced the concept of a low permeability barrier derived from site-contaminated groundwater management. Strategies for selecting materials, the physicochemical aspects influencing long-term efficacy, the intricacies of design and construction, and the challenges and prospects inherent in barrier technology are also covered in the review.

A REVIEW OF MICROBIALLY INDUCED CARBONATE PRECIPITATION IN THE REMEDIATION OF DIVERSE MINE TAILINGS

Miles, S. and S. O'Donnell | RemTech 2024: Remediation Technologies Symposium, 16-18 October, Banff, Alberta, Canada, 32 slides, 2024

Microbially induced calcite precipitation (MICP) may be a promising solution to address mine tailings storage, remediation and reclamation concerns. The microorganisms involved in MICP can effectively bind contaminants within tailings, acting as a source control treatment to prevent leaching into the environment. Additionally, forming calcium carbonate minerals contributes to tailings stability and strength, reducing the risk of landslides and erosion. Research indicates that MICP is effective across diverse tailings sources and conditions, including metal resources, coal tailings, and oil sands tailings. For oil sands mine tailings, MICP has demonstrated the ability to reduce permeability, improve dewatering, and enhance shear strength. The microorganisms in MICP can also immobilize contaminants in groundwater, preventing their spread to other areas. The formation of calcium carbonate minerals also helps neutralize acidic groundwater. MICP offers several advantages over traditional remediation methods, including 1) it is a natural process that avoids the use of harsh chemicals or heavy machinery; 2) it can be applied in situ, which is advantageous for remote or inaccessible tailings sites; and 3) it tends to be cost-effective, as the required materials are readily available and relatively inexpensive. However, different microorganisms may have varying metabolic capabilities, making them better suited to specific tailings and soil types. Site conditions, such as temperature, pH, and the presence of other contaminants, can impact the effectiveness of MICP.
Slides: https://esaa.org/wp-content/uploads/2024/10/RT2024-Miles.pdf
Longer abstract: https://esaa.org/wp-content/uploads/2024/09/RT2024-program-Abstracts-19.pdf

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