Technology Innovation News Survey

Entries for November 16-30, 2022

Market/Commercialization Information

IDIQ FOR REMEDIAL INVESTIGATIONS (RI), FEASIBILITY STUDIES (FS), TIME CRITICAL AND NON-TIME CRITICAL REMOVAL ACTIONS (TCRA/NTCRA), DECISION DOCUMENTS (DD) FOR PFAS IMPACTED SITES, ARMY NATIONAL GUARD (ARNG) INSTALLATIONS NATIONWIDE (SOL)

U.S. Army Corps of Engineers (USACE), Baltimore District, MD
Contract Opportunities on SAM.gov, Solicitation W912DR23R0020, 2022

This is a full and open competition under NAICS code 562910. USACE Baltimore District seeks a contractor for conducting Remedial Investigations (RI) and Feasibility Studies (FS) at Army National Guard facilities where aqueous film-forming foam (AFFF) or other PFAS releases have occurred. The activities conducted shall comply with CERCLA, as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300), and comply with USACE Requirements and Guidance for field investigations, including specific requirements for sampling for PFAS. Activities shall also comply with applicable DoD, Army, and ARNG regulations, policies, and guidance. PFAS are a suite of emerging chemicals of concern as defined by the Department of Defense Instruction 4715.18, Emerging Contaminants of Environmental Concern, effective 4 Sep 2019. This is due to the increasing regulatory interest, potential risk to human health and the environment, and evolving regulatory standards related to these chemicals. Preparation of Time Critical Removal Actions Decision Documents will be exercised during the associated RI/FS tasks, as needed. Offers are due by 4:30 PM EST on January 18, 2022.
https://sam.gov/opp/9c90a7a6aa4f4928a553248f1c139c42/view

R7 VALLEY PARK TCE OPERABLE UNIT 01 REMEDIAL ACTION - IN-SITU THERMAL REMEDIATION (SRCSGT)

U.S. Environmental Protection Agency, Region 7, Lenexa, KS
Contract Opportunities on SAM.gov, Solicitation 68HE0723R0017, 2022

This is a sources sought notice for marketing research purposes only under NAICS code 562910. EPA Region 7 plans to issue a Request for Proposal for a non-residential, site-specific contract for remedial actions to be performed within the Valley Park Superfund Site in St. Louis County, Missouri. A 36-month award is contemplated. The task will consist of site remediation of subsurface soil contamination using in-situ thermal remediation technology. The primary activities associated with the remedial action involve the treatment of soil contaminated with VOCs. Capability statements are due by 4:30 PM CST on January 10, 2023.
https://sam.gov/opp/567ca44c3c1a45379d420261fff4f1f7/view

ENVIRONMENTAL REMEDIATION (ERMA23 IDIQ DRAFT RFP) (PRESOL)

U.S. Department of the Army, Mission and Installation Contracting Command, Fort Sam Houston, TX
Contract Opportunities on SAM.gov, Solicitation W9124J-22-R-0005, 2022

This pre-solicitation notice is being issued solely to review the draft request for proposal (RFP) and RFP attachments under NAICS code 562910. The U.S. Department of the Army, Mission and Installation Contracting Command is contemplating issuing a request for proposals for a firm-fixed-price contract to provide environmental remediation services for 20 sites at Fort Carson, a U.S. Army installation located primarily in El Paso County, Colorado, near the city of Colorado Springs. Work in the base period will include: completing long-term management of SWMU 89 until 3 years of consecutive monitoring show contaminants of concern are below the Colorado groundwater standard; completing corrective measures implementation operations for the duration of the contract or until achievement of site closure, whichever comes first, at SWMU 109; completing a pilot study to determine effectiveness of a new remedy, E-Redox, at SWMU 109; completing implementation operations for the duration of the contract or until achievement of site closure, whichever comes first at CC-106-PCMS fuel point; providing annual maintenance for the GAC unit that is used for most IRP sites in assisting with IDW disposal; completing PFAS UFP-QAPP and Remedial Investigation for 9 areas and site investigations at the Golf Course and Building 1982; completing a remedial investigation at SWMU 171; constructing a metal building to encapsulate the outdoor portion of the GWTS at SWMU 13; and completing 1,4-dioxane & TCE plumes delineation at SWMUs 16 and 53. The period of performance (POP) shall not exceed 60 months from the date of award, inclusive of all exercised options. Individual POPs will be associated with separate CLINS. Companies is interested in this notice should submit their questions, recommendations, and considerations for reasonable and appropriate participation by small businesses by 12:00 PM CST on January 12, 2023.
https://sam.gov/opp/6253b43d89724d89b419c52de315f836/view

F -- SINGLE AWARD TASK ORDER CONTRACT FOR REMEDIAL ACTION AND MONOFILL CONSTRUCTION, UMIAT AFS, ALASKA (PRESOL)

U.S. Army Corps of Engineers, Pacific Ocean Division, Alaska District, Anchorage, AK
Contract Opportunities on SAM.gov, Solicitation W911KB23R0002, 2022

When the solicitation is released on or about January 6, 2023, it will be competed as an 8(A) set-aside. The U.S. Army Corps of Engineers, Alaska District, is planning to issue a request for proposals for performing a combination of on-site treatment and disposal, offsite disposal, and solid waste monofill construction at the Umiat Air Force Station FUDS located at Umiat, Alaska. The Umiat FUDS Landfill is a large unpermitted landfill created by the military services during the development of military assets in the north slope of Alaska in the late 1940s and 1950s. It is a complex contaminated site in a highly remote location that threatens to contaminate the adjacent Colville River and the traditional food sources of the native Alaskans in the region. Work will include designing the Hazardous, Toxic, and Radioactive Waste remedy and infrastructure improvements, mobilizing heavy equipment and technical specialists to the site, performing the necessary site improvements to conduct environmental sampling and studies, backhauling contaminated material, managing an onsite treatment system for non-hazardous contaminants, designing, constructing, installing, and maintaining hydraulic flood mitigation of the adjacent river, and conducting public meetings and stakeholder engagements. The resulting contract will be an Indefinite Delivery Indefinite Quantity (IDIQ) Single-Award Task Order Contract (SATOC) consisting of a three-year base period and two one-year option

periods. The overall capacity of this small-business SATOC will be approximately $75 Million. Work will be issued as individual task orders and all task orders combined will not exceed the $75 Million contract threshold. The guaranteed minimum amount for each contract will be $10K. https://sam.gov/opp/a772374c3d354bf2bda14f11c95b7fce/view

Cleanup News

COOKES PEAK MINE SAFEGUARD PROJECT

2022 NAAMLP Hard Rock Abandoned Mine Lands Reclamation Awards, 21 pp, 2022

The Cookes Peak Mine Safeguard Project involved seven construction phases conducted between 2014 and 2021 to safeguard more than 291 hazardous mine openings. Abandoned features included adits, shafts, stopes, high walls, and other dangerous conditions from legacy mining. A goal of the project was to use innovative technology to install vandal-resistant structures that would have a minimal impact on the landscape. In most instances, building a structure at the mine entrance would cause less disturbance to the landscape and provide valuable wildlife habitat. Great care was taken to avoid archaeologically important sites and each feature was checked just before destructive closures took place to ensure that no wildlife remained inside. The two biggest challenges for the project were accessing the mine features on very steep and rugged terrain and including features within a Bureau of Land Management (BLM) Wilderness Study Area (WSA). While the east and west sides of the project were less than a mile apart, they had to be accessed from different routes that entailed a one-hour drive from the nearest paved road, much of it over extremely rocky two-track paths. Milder slopes in the earlier phases allowed for the use of heavy equipment. Steeper slopes in latter phases required using helicopters to bring supplies and welding equipment to a cluster of mines or taking preconstructed gates directly to a feature and hand-backfilling work. A helicopter was used to get material and equipment as close to the WSA features as allowable. Consideration was given to each individual mine opening to determine the most appropriate closure method. Blind adits and shafts with little wildlife habitat potential were treated differently than those with more extensive mine workings. Steel structures were made of weathering steel, which obtains a rust patina and blends well with the surroundings. Dangerous mine openings were safeguarded through backfilling, horizontal and vertical bat gates, polyurethane foam plugs, steel mesh, steel picket fencing and bat cupolas. https://www.emnrd.nm.gov/mmd/wp-content/uploads/sites/5/Cookes-Peak-nomination-2022.pdf

COLLABORATIVE APPROACH TO REMEDIATION AT THE HOWARD MINE MILL AND TAILINGS AREA

Croston, J., H. Bains, J. White, and G. Sinnett.
British Columbia Mine Reclamation Symposium, 22-23 September, virtual, 16 pp, 2021

A remedial investigation was conducted at the former Howard Mine Mill and Tailings Area that included a mill and tailings deposit along the banks of the Salmo River. The mine wastes were acid-generating, contained metal concentrations greater than soil standards protective of human and ecological health, and were a source of river contamination. A small portion of the mine wastes extended onto adjacent residential properties and contaminated a drinking water well. Engagement with the community, indigenous peoples and government agencies was an important part of the remedial planning process that included meetings to seek input on the remedial plan and reclamation design. Consensus on the plan was achieved through this engagement, and remedial work was approved by the BC Ministry of Environment and Climate Change Strategy. Remediation included excavation and consolidation of mine waste into an approved hazardous waste facility covered with a bituminous geomembrane liner and growth medium. All disturbed areas were reclaimed, and an erosion barrier/artificial floodplain with fish habitat was constructed on the east bank of the Salmo River. A new drinking water well was installed for the adjacent landowner. The site is currently undergoing long-term monitoring to ensure the remedial works are performing as designed and to measure natural attenuation of residual contamination in groundwater. Remediation successfully removed terrestrial risks to human and ecological receptors and reduced metal concentrations in groundwater, porewater and surface water.
https://open.library.ubc.ca/media/stream/pdf/59367/1.0402668/5

SUCCESSFUL ACID MINE DRAINAGE ABATEMENT – BROAD TOP, PA

Mills, J. | West Virginia Mine Drainage Task Force Symposium, 4-5 October, Morgantown, WV, 35 slides, 2022

Forty-two passive acid mine drainage (AMD) treatment systems have been constructed in the Six Mile, Sandy Run, and Longs Run watersheds in Broad Top Township since 1979. The project's success and growing community interest in AMD abatement prompted a watershed study that identified illegal garbage dumping, sewage, and AMD as major problems. In 2005, a Watershed Implementation Plan completed for Longs, Sandy, and Six Mile Runs led to >$3.5 million of Clean Water Act Section 319 funds and >$500,000 of Pennsylvania Department of Environmental Protection Growing Greener Grant money to conduct AMD abatement projects in the watersheds. The AMD treatment systems were designed to treat high-flow discharges that vary in quantity and quality for at least 20 years. The design goal was to remove 90% of the metal and acid loads entering the streams. Challenging construction conditions were encountered at most of the treatment sites. The passive treatment technology chosen for each site was tailored based on the chemistry and flow at that AMD seep location. In 2014, after constructing 13 AMD treatment systems, Longs Run was delisted in the Pennsylvania Integrated Water Quality Monitoring and Assessment Report.
Slides: https://wvmdtaskforce.files.wordpress.com/2022/10/2022-7-mills-wv-amd-task-force-2022.pdf
Paper: https://wvmdtaskforce.files.wordpress.com/2022/10/2022-7-mills-paper-amd-abatement-paper-2022.pdf

Demonstrations / Feasibility Studies

IN SITU REMEDIATION OF METAL(LOID)-CONTAMINATED LAKE SEDIMENTS WITH ALKALI-ACTIVATED BLAST FURNACE SLAG GRANULE AMENDMENT: A FIELD EXPERIMENTIN SITU REMEDIATION OF METAL(LOID)-CONTAMINATED LAKE SEDIMENTS WITH ALKALI-ACTIVATED BLAST FURNACE SLAG GRANULE AMENDMENT: A FIELD EXPERIMENT

Laukkanen, J., E. Takaluoma, H. Runtti, J. Makinen, T. Kauppila, S. Hellsten, T. Luukkonen, and U. Lassi. | Journal of Soils and Sediments 22:1054-1067(2022)

Alkali-activated blast furnace slag (BFS) granules were used in a field experiment at Lake Kivijarvi, which was heavily affected by a mining accident in 2012 that released a significant peak load of metals and sulfate. The work evaluated the performance of novel amendment material to remediate in situ in real conditions with a preliminary cost estimation. Alkali-activated BFS granules were prepared and characterized for composition, microstructure, and surface properties. Two mesocosms were placed in the lake: one with

and one without granule dosing. Sediment and pore water samples were collected over 2 weeks. Similar small-scale experiment was performed in the lab for 3 months. The bioaccessibility of metals from sediments was assessed with a 3-stage leaching procedure. The granules effectively decreased Fe, Zn, Ni, and Cr mobility in all leaching stages by ~50-90% compared to unamended sediment in the mesocosm experiment. Lab-scale incubation experiments also indicated the decreased release of Ba, Co, Ni, Al, Fe, Mg, Mn, and S. The estimated material costs were lower than the removal of the contaminated sediments with dredging and off-site treatment. Results preliminarily showed the effectiveness of alkaline-activated BFS in remediating metal-contaminated sediments. Topics requiring further study are the leaching of trace elements from the material and the impact on sediment pH.
http://jultika.oulu.fi/files/nbnfi-fe2022042530261.pdf

ENHANCED DECARBONATION OF MINE DRAINAGE USING IRON OXIDATION

Means, B. and R.L. Beam. I West Virginia Mine Drainage Task Force Symposium, 4-5 October, Morgantown, WV, 13 slides, 2022

Ferruginous underground coal mine drainage in the Appalachian region contains elevated concentrations of inorganic carbon carbonic acid [H_2CO_3] or bicarbonate alkalinity [HCO_3^-] due to interactions between mine pools and alkaline recharge water. A novel strategy to minimize deprotonation of both carbonic acid and bicarbonate was implemented at two active treatment plants to promote ferrous iron oxidation and precipitation before, or in conjunction with, a decarbonation step. The acidity produced by iron hydrolysis serves to deprotonate bicarbonate, producing carbonic acid, which is then decarbonated before alkali addition. The process decreases bicarbonate and carbonate concentrations through transformation into carbonic acid before or during decarbonation, before pH adjustment. A 50% by wt. solution of H_2O_2 was used at one site to promote ferrous iron oxidization, while mechanical aeration was used at the other site. The strategy increased the removal of inorganic carbon from 26% to 56%, resulting in a net annual cost savings of 50%. Both sites were successfully geochemically modeled, indicating a cost analysis can be performed at sites to evaluate whether enhanced decarbonation, decarbonation or conventional alkali addition is most cost-effective.
https://wvmdtaskforce.files.wordpress.com/2022/10/2022-9-means-enhanced-decarbonation-means-10_4_22.pdf

PERFORMANCE OF SEMI-PASSIVE SYSTEMS FOR THE BIOLOGICAL TREATMENT OF HIGH-AS ACID MINE DRAINAGE: RESULTS FROM A YEAR OF MONITORING AT THE CARNOULES MINE (SOUTHERN FRANCE)

Diaz-Vanegas, C., C. Casiot, L. Lin, L. De Windt, M. Hery, A. Desoeuvre, O. Bruneel, F. Battaglia-Brunet, and J. Jacob. I Mine Water and the Environment 41(3):679-694(2022)

Two semi-passive treatment systems were installed and monitored for one year to treat As-enriched acid mine drainage (AMD) (≈ 1 g/L Fe(II) and 100 mg/L As(III)) at the Carnoules mine. Treatment was based on biological Fe and As oxidation by indigenous bacteria and subsequent As immobilization by ferric hydroxysulfates. Forced aeration and wood/pozzolana or plastic support were used for biofilm attachment. The system performance ranged from 86-98% for Fe oxidation, 30-60% for Fe removal, and 50-80% for As removal using a nine hr hydraulic retention time. No significant differences were measured between the two biofilm supports. The wood/pozzolana support had a shorter delay for performance recovery after interruptions. Iron oxidation rates were similar to those obtained in the Carnoules AMD stream and lab bioreactor, while As oxidation may have been enhanced. The sludge accumulated between 39 and 91 mg/g of As, mainly in the As(V) oxidation state; jarosite and amorphous ferric hydroxysulfate phases were the main Fe and As scavengers. Challenging environmental conditions during the long monitoring period confirm the robustness of the treatment units. The data will be useful in designing future full-scale treatment systems adapted to As-rich AMD.

THE USE OF USING BIOLOGICAL TREATMENT TO STABILIZE SCHWARTZWALDER MINE AND REDUCE LONG TERM WATER TREATMENT COSTS

Harrington, J. I CEMS Mining Mini-Conference, 11 May, virtual, 26 slides, 2021

Source removal reclamation projects, including mine dewatering, active ex-situ mine water treatment using reverse osmosis (RO), and in-situ mine pool microbiological treatment, were implemented at the Schwartzwalder mine. Microbial food sources added to the mine pool initiated in-situ microbiological treatment and improved the effectiveness and sustainability of the overall water treatment processes, first by removing contaminants by >90%, then by preventing water quality degradation as the RO concentrates were returned to the mine pool. Pilot testing of a wetland approach that could be implemented in the former source areas of the mine to treat residual contamination by acting as a buffer between the mine and the adjacent stream and providing redundancy to in-situ microbiological treatment is ongoing. Microbiological treatment in the mine pool and/or in constructed wetlands may offer promise to achieve the pending requirements in Colorado SB19-1113, which requires new or amended permits to "demonstrate a reasonably foreseeable end date for any water quality treatment" with more than 50% cost reduction compared to active water treatment only.
https://coems.org/wp-content/uploads/2021/03/Jim-Harrington-Presentation-Notes.pdf

Research

ACID MINE DRAINAGE REMEDIATION WITH SMALL SCALE CONSTRUCTED WETLANDS IN ANCASH HIGHLANDS - PERU

Leon, V., K. Aguirre, A. Gonzales, N. Herrera, A. Leon, D. Osorio, A. Quijano, and E. Palacios.
Proceedings of the 8th World Congress on New Technologies (NewTech'22), 3-5 August,
Prague, Czech Republic, 2022

Four small-scale constructed wetlands (SS-CWs) were constructed (0.59 m x 0.38 m x 0.24 m) and were continuously fed with acid mine drainage (AMD) collected from mining sites in the Ancash region, the main Cu (20.6%), Zn (38.0%), and Ag (19.6%) producer in Peru. The flow rate and hydraulic retention time were 5 L/d and 3.1 d, respectively. From bottom to top, the SS-CWs were composed of limestone, organic matter (40% compost, 40% animal manure, and 20% peat), and macrophytes (*Juncus imbricatus*) for SSCW 1, limestone and organic matter for SS-CW 2, limestone, organic matter, macrophytes and reducing sulfate bacteria for SS-CW 3, and gravel 3/8", organic matter and macrophytes for SS-CW 4. Influent AMD had a pH of 2.3 ± 0.1 (N=10), electrical conductivity of 3018 ± 257.7 mS/cm (N=10), and Fe concentration of 202.3 ± 34.6 mg/L (N=10). The effluent consisted of a pH of > 5.7, an electrical conductivity of >2149.2 mS/cm, and Fe concentration of <99.7 mg/L. A statistically significant pH difference (p-value: 0.022) existed between the four wetlands, though no statistically significant difference in Fe removal (p-value: 0.0733) was observed). The highest Fe removal efficiency occurred in SS-CW 3 (67.1% ± 8.7% [N=8]) followed by SS-CW 2 (64.1% ± 11.7% [N=9]), SSCW 4 (57.8% ± 8.4% [N=9]) and SS-CW 2 (51.4% ± 17.9% [N=9]). SS-CW 3 had all components of a constructed wetland and performed best, though the other SS-CWs also showed high efficiencies. https://avestia.com/NewTech2022_Proceedings/files/paper/ICEPR/ICEPR_113.pdf

A NEW APPLICATION OF SOLVENT EXTRACTION TO SEPARATE COPPER FROM EXTREME ACID MINE DRAINAGE PRODUCING SOLUTIONS FOR ELECTROCHEMICAL AND BIOLOGICAL RECOVERY PROCESSES

Nobahar, A., A.B. Melka, A. Pusta, J.P. Lourenco, J.D. Carlier, and M.C. Costa.
Mine Water and the Environment 41(2):387-401(2022)

Five extractants (Acorga M5640, LIX 54, LIX 622, LIX 622 N and LIX 864) diluted (15% [v/v]) in Shell GTL with 2.5% (v/v) octanol were compared and evaluated to recover Cu from an extreme AMD sample (5.3 ± 0.3 g/L Cu) collected at the inactive Sao Domingos Mine in Portugal. Acorga M5640 showed the best selective efficiency of the five extractants, extracting ≈ 96.0% of Cu from the AMD in one extraction step and the remaining Cu (to below detection) in three steps. Among the different stripping agents tested, 2 M sulfuric acid was the most efficient, stripping ≈ 99% of Cu. The recyclability of the organic phase was confirmed in five successive cycles of extraction and stripping. Contact time tests revealed that the extraction kinetics allows for ≈ 97% Cu transfer in 15 min. Aqueous-to-organic phase ratio tests demonstrated a maximum loading capacity of ≈ 16 g/L Cu in the organic phase. Raising the concentration of Cu in the stripping solution (2 M sulfuric acid) to ≈ 46 g/L through successive striping steps showed the potential to recover elemental Cu using traditional electrowinning. A biological approach to recover Cu from the stripping solution was evaluated by adding the supernatant of a sulfate-reducing bacteria culture to make different molar ratios of biogenic sulfide to copper; ratios over 1.75 resulted in precipitation of more than 95% of the Cu as covellite nanoparticles.
https://link.springer.com/content/pdf/10.1007/s10230-022-00858-7.pdf

USING THE FORESTRY RECLAMATION APPROACH FOR RECLAIMED SURFACE MINELAND IN THE WESTERN GULF: EFFECTS ON *PINUS TAEDA* SEEDLING GROWTH AND SURVIVAL

Phillips, C., J. Stovall, H. Williams, and K. Farrish. Forests 12:845(2021)

A study compared the Forestry Reclamation Approach (FRA) low-compaction method used in the Appalachian region with conventional scraper-pan (scraper) methods in the Gulf Coastal Plain (GCP). This study used the FRA with common silvicultural practices of the western Gulf. The two-hectare study site was installed using a randomized complete block design with three replicates comparing conventional scraper reclamation used in the region with that of an unmined control and the FRA-style low compaction treatment. Following soil reclamation, containerized loblolly pine (*Pinus taeda* L.) seedlings of a western Gulf provenance were hand-planted. Soil chemical and physical parameters were assessed on each treatment to determine the effect the FRA and scraper method had on resulting tree seedling growth and survival. After three growing seasons, seedlings in the FRA plots had significantly greater tree volumes than the scraper ($p = 0.0139$) and the control ($p = 0.0247$) treatments. The FRA plots also had a 97% survival rate, while scraper plots had a survival of 86%. The FRA plots had significantly lower soil bulk densities than scraper ($p = 0.0353$) and control ($p < 0.0001$) plots which likely influenced growth and survival trends. Soil nutrients were increasingly available on the FRA and scraper plots, likely due to the mixing of the soil profile compared to the unmined control. Leaf-level water potential and gas exchange were not correlated to growth and survival and did not differ among treatments. Results suggest reclamation practices modeled after FRA methods may benefit tree growth and survival in the western Gulf. https://www.mdpi.com/1999-4907/12/7/845/pdf?version=1625031657

EXPERIMENTAL PRACTICE LAND APPLICATION OF TREATMENT LIME SLURRY SLUDGE PROJECT IN CLARION COUNTY PENNSYLVANIA

Yeakle, C. | 2022 PA Abandoned Mine Reclamation Conference, 22-23 June, State College, PA, 25 minutes, 2022

This presentation provides an overview of an experimental land application of sludge generated from an active treatment system to treat acid mine discharge at the REM Coal Orcutt Smail site. Sludge generated by the treatment system that uses a lime slurry to treat AMD is collected in a series of ponds and then pumped into Geo Tubes. In 2018, the Geo Tubes were filled and required removal. The Knox District Mining Office suggested that land application of the sludge would support vegetation and could benefit land use on properties with abandoned mine features from pre-act mining. State Game Lands 74 in Clarion County was selected for the experimental site to enhance a ~2-acre food plot. The sludge was allowed to rest until it was sufficiently dry to till and disc in preparation for planting in November 2018. The presentation covers the experimental practice, lessons learned, and the results.
https://www.youtube.com/watch?v=RfRKL75e7rs&feature=emb_imp_woyt

IN-SITU STABILIZATION/SOLIDIFICATION OF LEAD/ZINC MINE TAILINGS BY CEMENTED PASTE BACKFILL MODIFIED WITH LOW-CARBON BENTONITE ALTERNATIVE

Chen, Q., K. Luo, Y. Wang, X. Li, Q. Zhang, and Y. Liu.
Journal of Materials Research and Technology 17:1200-1210(2022)

The mechanical performance and heavy metal retention of cemented paste backfill (CPB) were evaluated by comparing the different binder strategies of ordinary Portland cement (OPC), Ca-bentonite, and Na-bentonite. The phase composition and internal microstructure were obtained by X-ray diffraction (XRD) and scanning electron microscopy (SEM). Toxicity characteristic leaching procedure (TCLP) was performed to ascertain the effectiveness of heavy metal retention capacity. Bentonite effectively optimized the uniaxial compressive strength (UCS) at early ages. Despite deterioration observed at 28 days, UCS values qualified for the engineering application. Amorphous content was quantitatively characterized with XRD and SEM analysis, highlighting the importance of amorphous content in regulating mechanical properties. TCLP results indicate that all the Pb, Cd, and As were predominantly incorporated within the cementitious matrix, though Zn leachability decreased with the Ca-bentonite proportion. The leachates met the regulation limits (0.1 mg/L) at the CPB samples with 1.28 wt% of Ca-bentonite.

General News

A METHODOLOGY COMBINING IDEF0 AND WEIGHTED RISK FACTOR ANALYSIS FOR THE STRATEGIC PLANNING OF MINE RECLAMATION

Spanidis, P.-M., C. Roumpos, and F. Pavloudakis. | Minerals 12(6):713(2022)

This paper investigates the geoenvironmental and socioeconomic problems of reclamation. It also questions how the strategic planning of a reclamation project can be performed and how the relevant project risks can be investigated and managed. A prototype methodology based on experts' judgment is suggested with a case study combining: (a) the IDEF0 (Integrated DEFinition Function)

modeling technique, as a low-cost and easy-to-develop tool enabling strategic planning of reclamation projects; and (b) the Weighted Risk Factor analysis (WRF) as a suitable method for effective risk analysis and response planning in post-mining frameworks. *This article is* ***Open Access*** *at*https://www.mdpi.com/2075-163X/12/6/713.

REMOVAL OF SELENIUM BY REDUCTION TO SELENITE AND SURFACE COMPLEXATION

Laliberte, M. and M. De Ladurantaye-Noel.
Proceedings of Mine Water Solution, 14-16 June, Vancouver, Canada, 2022

The TracerTM Se process (patent pending) was developed as a method to remove selenium based on biological reduction of selenium to selenite, its subsequent removal from water using surface complexation on ferric oxyhydroxide, and further biological oxidation of the treated water. This article reviews the mechanisms understood to create selenium toxicity in the environment and the leading existing technologies to remove selenium. Test results of the Tracer Se process are also presented. *See pages* ***295-307:***
https://www.mineconferences.com/files/ProceedingsofMineWaterSolutions2022.pdf

HIGH-PRESSURE SLURRY ABLATION: NOVEL APPROACH TO ABANDONED MINE LAND RECLAMATION

Lee, J. | The 43rd Annual Conference of the National Association of Abandoned Mine Land Programs, 16-20 October, Grand Junction, CO, abstract only, 2022

The High-Pressure Slurry Ablation (HPSA) technology uses a mechanical process without chemicals to separate radioactive material from waste rock and produce higher concentration uranium ore to be used for recycling while minimizing mill waste tailings. HPSA further reduces the tailings waste volume generated by recycling the material at a uranium milling facility. HPSA technology can be highly valuable in remediating abandoned and inactive mine sites. The technology has demonstrated its exceptional ability to fulfill the specific need for the selective liberation of uranium and other valuable minerals in an energy-efficient manner, particularly when mineral-rich layers can easily be separated from the host rock. Evidence of HPSA's efficiency is best represented by how it processes uranium mine waste rock from uranium-hosted sandstone formations, where the soft mineral patina coatings of uranium can be easily separated (disassociated) from the harder sand grain. This disassociation concentrates uranium into the finer particle fraction of the material mass, making it more economically viable for physical and chemical separation (milling) downstream. The presentation covers work with Idaho National Lab, a treatability study conducted on the Navajo Nation, work done with other partners on abandoned uranium mines, and discusses other tailings re-processing. *For more information on HPSA, see*
https://www.youtube.com/watch?v=zY6Zony9pno

THE IMPORTANCE OF GETTING MINE CLOSURE COSTING RIGHT

M. Murphy.
British Columbia Mine Reclamation Symposium, 19-22 September, Kimberly, BC, 13 pp, 2022

This paper examines the impact of closure costing as an afterthought, the importance of "getting it right," how mines can reduce liability by addressing obligations during operations, and the methods available to mining companies to improve closure cost estimates. https://open.library.ubc.ca/media/stream/pdf/59367/1.0421795/5

AN INVERSE SOIL-PLANT-ATMOSPHERE MODEL TO ESTIMATE VEGETATION AND HYDRAULIC PROPERTIES OF MATERIALS FROM FIELD MEASUREMENTS TO IMPROVE PERFORMANCE PREDICTIONS AND CONFIDENCE IN MINE RECLAMATION

Shurniak, R.E. | British Columbia Mine Reclamation Symposium, 22-23 September, virtual, 12 pp, 2021

Using the GoldSim software, a simplified Soil-Plant-Atmosphere (SPA) model was developed to estimate vegetation and hydraulic properties quickly and objectively. These properties can then be validated within more rigorous and recognized SPA modeling software. The process can also be tailored to identify potential equifinal solutions, which can usually be eliminated through multiple-factor calibration. The model results are calibrated vegetation and hydraulic properties that can be used to predict mine reclamation performance confidently. An example where this process has been successfully applied at a reclaimed site in the Northern Hemisphere is provided. https://open.library.ubc.ca/media/stream/pdf/59367/1.0402760/5

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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