

2023 ITRC Project Team Final Proposal

Proposed Project Title

Reuse of Solid Mining Waste

Proposal Contacts

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Abstract

As the nation considers sustainability related to climate change and moves towards cleaner energy production, the need for responsibly and reliably sourced minerals and materials will increase. Meeting this need will necessitate increasing domestic mineral production. Recycling and reusing existing materials will decrease wastes and increase the functional lifespan of many minerals and materials. Where appropriate, reprocessing existing mining wastes (tailings, chat, etc.) to extract additional minerals may be a more environmentally responsible way to increase domestic mineral production.

This project will address practical obstacles to, and best management practices for, environmentally safe reuse of solid mining waste (tailings, chat, etc.).

Problem Statement and Highlight the Importance to the States and to the Broader Environmental Community

Nationwide, there are more than 500,000 abandoned mine sites. All sites have several acres to many square miles covered with various volumes of solid mining waste (tailings, chat, etc.). From a commercial perspective, most of the metals of interest at the time mining operations occurred were removed from the mined materials. However, mineral extraction methods have improved over time. Many materials considered wastes at the time they were initially processed may contain recoverable mineral concentrations with current technologies. Additionally, interest in trace and rare earth minerals has increased over time. Reprocessing mining wastes to extract these minerals may be worthwhile. One consideration for reprocessing or reusing these materials is that from a health and environmental perspective, the remaining metal concentrations are often high enough that risks may be present for human health and the environment.

Solid mining waste has been reused in many ways in the past, both safe and unsafe. On the positive side, chat from lead mining in the Tri-State Mining District of Missouri, Oklahoma and Kansas has been safely incorporated into road beds and paving materials for many years. Chat has also successfully been used in remedial actions as material for backfilling adits and mine voids. With these reuses, mining wastes have been encapsulated or moved to isolated areas, thus decreasing the potential for exposure to the remaining metals in the waste material. On the other hand, chat has been used as fill material for housing construction or in yards, on roads to improve traction in the winter and for various uses in children's play areas (fall areas around equipment, sandbox fill, etc.). These uses have increased the potential for exposure, and thus for adverse human health and environmental issues. Mining wastes have been used for these and other uses at mining sites across the nation. This project will examine the possibilities for environmentally safe reprocessing and reuse of chat, tailings, waste rock, and other solid mining wastes.

There are technical and regulatory barriers to re-using solid mining waste. Currently, little information is available to regulators and mine site operators on re-using solid mine waste, making the technical and regulatory barriers appear more significant. Thus, regulators and mine site operators are left with fewer options to efficiently manage solid mine wastes.

Technical barriers to reusing solid mining waste can include:

- Volume of material – There can be millions of tons of solid mining waste at a site, which can be overwhelming.
- Potential for exposure to solid mining wastes – All solid mining waste has some residual metal contamination which may be present in concentrations sufficiently high to create human health or environmental risks. The metals may have been the metal of commercial interest or may be other metals in the solid matrices that were not of value when the mining occurred.
- Potential for exposure to other process related by product chemicals - Solid mining waste may have other residual contaminants of concern (for example, cyanide) or characteristics (such as net acid generating capacity), which can be, or can lead to, potential exposure risks.

The potential for exposure is a minus from a human and ecological health perspective; however, there may be economic benefit from reuse in applications where the risk is accounted for or minimized. Removing for metals, metalloids and rare earth elements may reduce volumes of overall waste that has to be managed in perpetuity. Reprocessing and reusing mining wastes may reduce the risks associated with mining wastes or other by-products, either physically or chemically.

Regulatory barriers to reusing solid mining waste generally revolve around RCRA rules and Superfund liability. Many mining sites are abandoned and have no responsible party to pay for cleanup. This leaves huge volumes of mining waste on the surface, creating health and environmental issues as well as removing land from productive use. The land and associated solid mining waste can't be reused because potential users do not want Superfund liability for the whole site. Environmentally responsible reuse would decrease volume of waste and allow reuse of land. Given the intent of safe reuse of the solid mine waste, and mitigation of potential exposure at the site, Superfund liability may become less of a deterrent to potential users or reprocessors. Though this project will focus on the technical barriers, technology and best management practices to reduce risks from exposure, regulatory barriers will be evaluated. It is anticipated that some technology solutions will facilitate an approach to address regulatory constraints.

Currently there is no one place where information on consistent, safe ways to reuse this material is available. We propose forming a team which will:

- Determine potential environmentally responsible best management practices for reprocessing and reusing for solid mining material; and
- Explore and address potential technical and regulatory issues with each reuse.

The team will then create a technical and regulatory guidance document which will identify a series of best management practices for reuse, address the technical and regulatory barriers in depth, and develop potential solutions for all practical barriers.

The timeframe for this team is 2 years. The tentative schedule for this team is:

- January 2023 – Team formation
- January 2023-December 2025 – Guidance Document Development
- July 2025-December 2025 – Develop Internet based training

This guidance will be useful for:

- State and federal project managers involved in clean up and regulation of active and abandoned mining sites.

- State and federal agency staff involved in long-term stewardship of hazardous materials, pollution prevention and health and risk assessment.
- Local health department staff often left with assisting local city and county jurisdictions with land use controls and zoning.

This guidance will be useful for non-governmental organizations (NGOs) involved in evaluating potential risk reduction measures during partial and full site response actions. The guidance will also facilitate an understanding for the NGOs of how solid mine waste may be appropriately reused, as they assist states and federal regulatory managers with evaluating response action proposals. This guidance will also be useful to consultants who support those working with mining sites.

Lastly this guidance will be useful to the mining, aggregate industry, and property development organizations.

Project Deliverables

The team will produce:

- A Technical and Regulatory Guidance Document on the best management practices for the environmentally safe reuse of solid mining waste, and
- An internet-based training on the document.

State Team Leader

Which, if any, states have indicated an interest in leading the team and providing a Team Leader:

1.

Additional Information

Based on initial assessments, a team would be comprised of representatives from:

- States of Missouri, Oklahoma, Kansas, Colorado, Arizona, Utah, Pennsylvania, New Mexico and other mining states (both project management and risk assessment staff).
- EPA's abandoned mine lands program
- EPA's national mine work group
- National Association of Abandoned Mine Land Programs
- Bureau of Land Management, US Fish and Wildlife Service,
- Consultants
- Mining firms
- Community, Tribal & Environmental Stakeholders