Carbon Removal Alliance

March, 2026

Carbon dioxide mineralization

Carbon mineralization technologies support the U.S. mining industry by turning waste materials into valuable assets, enabling the enhanced recovery of critical minerals, remediating legacy mining operations, and generating new streams of revenue for mining companies.

Today, there are thousands of abandoned mines or mineral processing facilities on federal land. These sites pose significant environmental liabilities and public health risks costing the federal government hundreds of millions of dollars in remediation and public health spending. At the same time, they possess untapped economic potential including substantial deposits of critical minerals that are essential to American energy and supply chain security.

How does mineralization work?

Mineralization uses byproducts from the mining industry in carbon removal operations. These materials react naturally with atmospheric carbon dioxide to form new minerals, sequestering the carbon dioxide for millennia. Mineralization companies accelerate this process by applying high-intensity energy or chemical treatments to the byproducts, liberating the reactive minerals contained in the waste rocks. These minerals are then exposed to atmospheric carbon dioxide, resulting in safe, measurable, and durable carbon removal. The mineralization process also changes the chemistry of the rocks, enriching the waste materials and making it easier to extract the remaining critical minerals present in mining sites' waste.

This process works on both active mines and legacy mines and has tremendous potential in the United States — it could remove over five million tons of carbon dioxide annually by 2030.

- **Active mines:** Active mines in the United States produce over 1.8

MINERALIZATION IN PRACTICE

Carbon mineralization can help access critical minerals left behind while remediating public health risks, all while utilizing byproducts from the mining industry. One example of this in practice: Our members' technology can work with abandoned asbestos mines in the United States to sequester millions of tons of carbon dioxide while destroying the toxic asbestos fibers and increasing the recovery of critical minerals like nickel and cobalt from these sites. This improves the environmental safety of these sites and the surrounding communities and advances America's critical mineral goals.

billion tons of processing waste each year. Recovering the critical minerals in this waste would be enough to meet America's critical goals by itself.

- **Legacy mines:** There are thousands of legacy mines on federal land. These sites are often an environmental liability for the federal government and many have no clear path toward remediation. Nearly 100 of them are on the Environmental Protection Agency's Superfund National Priority List, indicating the severity of their environmental liability.

Potential impacts

Carbon mineralization can provide substantial benefits to the domestic mining industry, create thousands of new jobs, and protect American critical mineral supply chains.

- **Enhanced critical mineral recovery:** Carbon mineralization can improve the recovery of critical minerals such as nickel and cobalt as well as rare earth elements. This is both an incredible economic and national security opportunity. Rare earth elements are key to American defense — a single F-35 fighter jet uses 900 pounds of rare-earth elements. Yet, China dominates the global supply of these materials, which they have already begun to weaponize with export restrictions on minerals necessary for American national security.
- **Improved operational efficiency:** Carbon mineralization can reduce the amount of waste products produced in the mining process and provide an effective waste management solution for legacy mine sites. This will lower the cost of waste treatment and management and improve the efficiency of mining operations.
- **New revenue opportunities:** Carbon mineralization can provide a new source of revenue for mining companies. This revenue is an opportunity to diversify mining revenue streams and boost profitability. The revenue potential from carbon mineralization on mine sites is $100 billion — and more waste material is generated every day.

Mineralization technology is an innovative and exciting field, developed in part by leading researchers in the U.S. National Laboratories. These technologies need to conduct small-scale technical assessments and pilot deployments on legacy mine sites (including EPA Superfund sites). This will enable mineralization companies to generate the data and validation needed to catalyze wide-scale adoption by the domestic mining industry.

Photo courtesy of Travertine

FY27 Appropriations

Environmental Protection Agency (EPA)

Environmental Monitoring and Remediation Technology Assessment Initiative (EMRTAI)

Subcommittee: Interior, Environment, and Related Agencies

Account: Hazardous Substance Superfund

Funding level requested for FY27: $10 million

Report language request: *"Innovative Mining Technology" — The Committee recommends $10,000,000 to continue the Environmental Monitoring and Remediation Technology Assessment Initiative for three additional years. The Committee recognizes the importance of advancing technologies with the purpose of critical mineral extraction or stockpiling enriched materials. The Committee supports coordination between the relevant offices at the Environmental Protection Agency, the Environmental Protection Agency Abandoned Mines Land Team, the Department of the Interior, the Bureau of Land Management, the Department of Energy, and the U.S. Forest Service to prioritize sites with high economic potential. In carrying out this section, the Committee supports the prioritization of technologies that create multiple, diverse, revenue streams from the same waste material including carbon sequestration.*

Why this matters to the Carbon Removal Alliance and our members: Today, there are thousands of abandoned mines or mineral processing facilities on federal land that represent significant environmental liabilities and public health risks. Nearly 100 of these sites are on the EPA's Superfund National Priority List, potentially costing the federal government hundreds of millions of dollars in remediation spending. At the same time, these sites possess untapped economic potential, containing substantial deposits of critical minerals essential to American energy and supply chain security.

The Carbon Removal Alliance represents companies like Arca, Anvil, Karbonetiq, and Travertine that can integrate carbon removal directly into these mining operations. Carbon removal technologies can help turn these environmental cost centers into economic engines by providing mining companies with new, stable revenue streams — estimated at $100 billion for mafic and ultramafic mines alone. These partnerships can improve operational efficiencies, such as enhanced recovery of nickel, cobalt, and phosphorus, while permanently sequestering carbon dioxide in mineral waste.

Further empowering EMRTAI aligns with current administrative priorities to reduce reliance on foreign supply chains and counteract foreign dominance in rare earth elements. By supporting technical validation and field deployment at Superfund sites, EMRTAI provides a practical mechanism to operationalize President Trump's Executive Order on increasing American mineral production and Secretary Burgum's 2025 Order on streamlining mineral recovery from mine waste. This program serves as a critical bridge for risk-averse mining industries to adopt innovative technologies that transform environmental liabilities into strategic national assets.

Previous appropriations: The EMRTAI program was initially launched in 2024 through a competitive solicitation as a public-private partnership with the Battelle Memorial Institute. It was originally designed to run from 2024 – 2027 with a total budget of $3 million, funded through a cooperative agreement. This funding has already catalyzed four technology assessments focused on critical mineral extraction, but an expansion is necessary to evaluate the hundreds of other viable legacy mine sites across the country.

Mineralization facts

$100 billion

The revenue potential from carbon mineralization on mine sites

900 pounds

The amount of rare earth minerals a single F-35 fighter jet uses

Nearly 100

The number of abandoned mine sites on the Environmental Protection Agency's Superfund National Priority List

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Thanks for reading.
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