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Critical Minerals and Great Power Competition:
Utah's Role in Countering China's Dominance

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Abstract

China controls Utah's and the United State's access to smartphones, medical and military equipment, and other technologies through its chokepoints on critical minerals. China's current and past restrictions of US access to these critical minerals have prompted the US to secure its critical minerals supply chains.

Utah is home to fifty of the sixty critical minerals, placing it in a strategic spot domestically. There are noted challenges to expanding the critical minerals market within the state such as environmental concerns, necessary geological data collection, and long permitting timelines. Utah has begun to partially address these issues through government and academic initiatives, but security of the critical minerals supply chain requires additional action.

Recommendations for Utah include actions such as expanding funds for the Earth Mapping Resources Initiative (Earth MRI) program, increasing in-state refining capabilities through government provided incentives, and utilizing Utah work groups to evaluate the mining process from exploration to extraction for current barriers to address.

Introduction

At any given moment, the United States could lose access to smartphones, life-saving military and healthcare equipment, data centers, wind turbines, and other commodities that define modern American life.[1] Access to these vital technologies relies on foreign countries such as the Democratic Republic of Congo (DRC) or China, who have leverage on the raw or refined critical minerals.[2] China's control stems from its command over most of the processing of critical minerals in the global market, which are core requirements for modern technologies.[3] China and the Democratic Republic of Congo (DRC) have restricted the United States' access to critical minerals through specific export controls. The DRC set an export ban on cobalt for several months starting in February of 2025, replacing the ban with an export quota in October of the same year. China set export controls on critical minerals in February, April, and October of 2025. China has since suspended the export controls it made in October for one year, but has kept the April export controls in effect.[4] Other countries, such as Gabon and Indonesia, currently have or have had export restrictions to the United States on critical minerals they produce.[5]



EXPORT BANS

In recognition of the vulnerable supply chains for critical minerals the United States needs, the federal government has expanded efforts to reduce the reliance on foreign countries for critical minerals by sourcing the supply domestically. This white paper will explain what critical minerals are and the current landscape, issues, and initiatives addressing critical minerals in Utah along with providing potential recommendations for all stakeholders.

This paper draws on publicly available sources and interviews with experts such as Dr. Simon Jowitt, Dr. Stephanie Mills, and other established figures from Utah's mining industries and universities.

What are Critical Minerals

A critical mineral has been defined in federal law under the Consolidated Appropriations Act, 2021, as a "mineral, element, substance, or material"[6] that meets the following criteria:

> "(1) essential to the economic or national security of the United States; (2) the supply chain of which is vulnerable to disruption (including restrictions associated with foreign political risk, abrupt demand growth, military conflict, violent unrest, anti-competitive or protectionist behaviors, and other risks throughout the supply chain); and (3) serve an essential function in the manufacturing of a product (including energy technology-, defense-, currency-, agriculture-, consumer electronics- , and healthcare-related applications), the absence of which would have significant consequences for the economic or national security of the United States."[7]

The United States Secretary of the Interior oversees the process of designating critical minerals, which involves input from the public, federal secretaries and agencies, the United States Trade Representative, and the United States Geological Survey (USGS).[8] After consulting with the stakeholders and evaluating the USGS methodology of identifying which substances are critical minerals, the Secretary of the Interior will provide written notice to Congress and publish the list publicly.[9] Every three years, or sooner if needed, the Secretary of the Interior in collaboration with stakeholders shall review the previous list of critical minerals and update it accordingly to reflect the ever-changing economic and security needs of the United States.

The most recent designated list was published by the USGS under the Department of the Interior in November of 2025. The table below shows some of Utah's prominent critical minerals and their primary uses.[10]

Materials such as rare-earth elements, base metals, agricultural inputs, and fuel commodities, are also on the list.[11] Such additions reflect the broad analysis conducted in ascertaining not only minerals needed, but other critical commodities needed by the United States.

USGS has stated that the commodities, "rhodium, gallium, germanium, tungsten, niobium, magnesium metal, potash, and several rare earth elements," have the highest risk of supply chain disruption.[12]

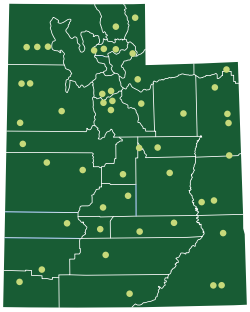
Critical Minerals in Utah

Utah plays a significant role domestically as the state is home to fifty of the sixty critical minerals.[13] The state oversees the mining and processing of eleven critical minerals. Fourteen rare-earth elements are additionally brought in from out of state and processed in the United States' only uranium mill located in Utah.[14] Furthermore, nine critical minerals have been mined or have a known significant source within the state in the last five years and seven others historically. Utah holds an additional twenty-three critical minerals which are viewed as being unlikely to be extracted in their current state.[15]

Utah's primary critical minerals mined within the state are as follows:[16]

Mineral	Usage
Beryllium	Used to manufacture metal alloys for aerospace and defense
Copper	Used widely in wiring and cables
Fluorspar	Used to make synthetic materials and plastics, iron and steel, ceramics, glass, and refineries
Lead	Used in batteries, ammunition, glass and ceramics production
Palladium	Used in catalytic converters, electronics, and as a chemical catalyst
Phosphate	Used in fertilizers
Platinum	Used in catalytic converters, aerospace alloys, chemical refining and petroleum processing
Potash	Used in most fertilizers
Silver	Used in electrical circuits, batteries, solar cells, and anti-bacterial medical instruments
Tellurium	Used in solar cells, to strengthen steel and copper, and to produce rubber, microchips and laser diodes
Uranium	Used as a nuclear fuel and in medical applications

These minerals are primarily mined at Spor Mountain, operated by Materion Resources; Lost Sheep Mine, operated by ARES Strategic Mining; and Bingham Canyon mine, operated by Kennecott Utah Copper Company. Energy Fuels, located by Blanding, UT, produces primarily uranium, but has increasingly processed earth materials which yield rare earth elements.[17] Utah has additionally recently mined or known reservoirs of aluminum, gallium, germanium, indium, lithium, magnesium metal, rhenium, vanadium, and zinc.[18]



Mineral Mines Across Utah State

Effect on Utah's Economy

While the mining industry in Utah operates as a relatively small contributor to its gross domestic product (GDP) and government budget, it still hosts the only uranium mill in the US which is capable of helping to produce rare earth products, one of two copper smelters in the US, and the only domestic producer of beryllium, supplying roughly fifty-five percent of the global production of the mineral.[19]

Overall Economic Output: The mineral production value in 2025 was $3.9 billion and accounted for roughly one to two percent of Utah's GDP.[20]

State Revenue Contributions: Mining companies have paid $87 million in property taxes and mining related severance taxes, in addition to contributing to the $83 million in federal mineral lease disbursements to the State of Utah in 2024.[21]

Workforce and Wages: In 2025, there were 11,200 mining employees in Utah.[22] The average wage of a mining employee was $90,000–$95,000, and employment grew at an average of 6.40% annually 2021–2025.[23]

Critical Minerals Initiatives in Utah

As interest in critical minerals has continued to rise in recent years, several initiatives have been started to expand Utah's role in securing the United States' supply chains.

Federal Government Actions

Earth MRI is a federal initiative to "collect multiple types of data across the full extent of the nation, including geologic, geophysical, geochemical, topographic and other kinds of data," with the goal of "providing important information about potential mineral resources," to interested parties to use.[24] Currently in Utah, there are nine Earth MRI projects in phases of progress and an additional two projects which were completed in 2023.[25] The geological mapping data collected by the program is released to the public for free use.[26]

State Government Action

Utah has seen both executive and legislative efforts to create further economic opportunity for critical mineral mining in the state. Mission Critical is a policy initiative from Governor Spencer Cox seeking to expand Utah's market capture of the domestic demand for critical minerals to twenty to twenty-five percent.[27] To achieve this goal, the policy initiative aims to reduce the average permitting time to under eighteen months, process over half of the mined minerals within the state, and establish a center and research lab for critical minerals.[28]

The 2026 general session reflected this momentum with the State Legislature passing four primary bills supporting the expansion of research and oversight of projects pertaining to critical minerals.

Senate Concurrent Resolution 4, Concurrent Resolution Regarding Permitting of Oil, Gas, and Mining: This resolution expresses formal legislative support for a cooperative agreement with the Bureau of Land Management (BLM) in the effort to improve the permitting process for oil, gas, and mining operations on BLM lands.[29]

Senate Concurrent Resolution 9, Concurrent Resolution Regarding Critical Minerals Development and Funding: This resolution signifies legislative support for creation of the Minerals for Industrial, National, and Economic Security Center (MINES Center) recommended by a working group originating from legislative efforts in 2025.[30]

SB 254, Extracted Natural Resources Amendments: This bill, passed in the 2026 general session, is the most expansive legislation covering critical minerals in Utah. It implements financial mechanisms such as critical mineral zones, tax credits, and the Critical Minerals Development Account for the state to assist the private companies in the permitting and extraction process of critical minerals. The bill also creates the Critical Minerals Council which seeks to provide oversight of the state's critical minerals efforts and collaboration with academic and private market parties.[31]

HB 437, Environmental Permitting Amendments: This legislation authorizes the Department of Environmental Quality and Division of Oil, Gas, and Mining to examine the environmental permitting process and create a program for expediting the review process of those permits.[32]

Private Market Projects

Provo-based company Ionic Mineral Technologies confirmed a discovery of a deposit of rare earth and critical minerals in its Silicon Ridge project on December 12, 2025.[33] This deposit consists of concentrations comparable to China's deposits, hosting critical minerals such as "gallium, germanium, rubidium, cesium, scandium, lithium, vanadium, tungsten, niobium," and light and heavy rare earth elements.[34]

Ares Strategic Mining announced on February 18, 2026, that it had started mining operations at its Lost Sheep Mine which primarily consists of extracting fluorspar with the potential of gallium in the future.[35] Fluorspar is primarily used to make synthetic materials and plastics, iron and steel, ceramics, glass, and refineries. Gallium is used for semiconductors.[36] Ares Strategic Mining also will host two processing plants in Delta, Utah, allowing the mining operation to turn the raw ore into industrial products.[37] This project will be the only domestic mine operation to extract and process fluorspar further expanding Utah's role in the critical mineral supply chain.

A company from California, Lilac Solutions, has started progress on a new extraction method for gathering lithium from the Great Salt Lake Brine.[38] This method consists of using "proprietary ion exchange media that targets lithium ions while allowing other dissolved minerals to remain in solution."[39] This technique is commonly referred to as direct lithium extraction (DLE) and has the potential to pull lithium out of the water in a manner that avoids overconsumption of the water, making it appealing amid efforts to conserve the Great Salt Lake.[40] After completing a pilot program in 2025, Lilac Solutions is currently in phase one of its operations to extract 5,000 tons annually of lithium carbonate equivalent in 2026 from the Great Salt Lake.[41]

Additionally, two mining projects have been in stages of progress. Mariana Minerals has reopened a copper mine in San Juan County.[42] This mine could potentially address some of the current copper supply requirements by the US.[43] Trigg Minerals, LLC has started development on its Antimony Canyon Project in Garfield County, Utah.[44] This antimony mining project is accompanied by separate tungsten mill project which would help with the US supply chains on both minerals.[45]

Academic

Utah's academic institutions have signaled interest in expanding efforts on critical minerals with the University of Utah announcing the formation of the Institute for Critical and Strategic Minerals (ICSM) on April 14, 2026. This institute seeks to "expand sustainable, domestic sources and production of critical minerals and rare earth elements, the raw materials vital for advanced technologies," and is subject to approval from the Utah System of Higher Education.[46]

Current Issues

Regulation and Permitting

In 2025, the federal government owned 64.4% of the land in Utah. The rest of the land ownership is either privately owned (21.1%), state owned (10%) or governed by tribal nations (4.5%).[47] Consequently, any mining company seeking to invest in mining operations must not only navigate state regulations but additionally deal with the processes overseen by the Bureau of Land Management (BLM) along with standard federal regulations such as National Environmental Policy Act. Recent federal cuts to funding and staffing to BLM and other comparable agencies are expected to increase permitting times across the US, which will disproportionately affect Utah with the current landownership split.[48]

> **"In 2025, the federal government owned 64.4% of the land in Utah."**

Public Pushback & Environmental Concerns

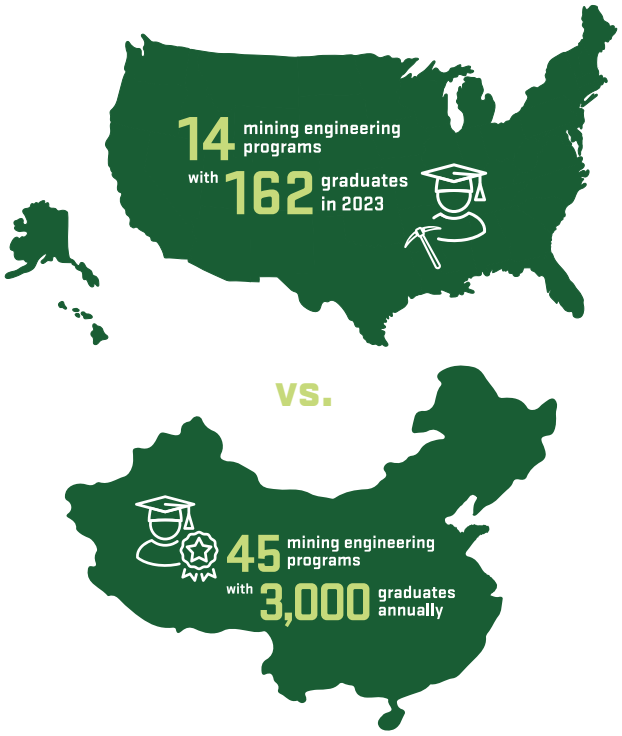
Citizens and tribal nations have raised concerns and pushed back against potential and current mining projects. A Utah State University poll found that the majority of people polled supported stronger environmental regulations, and 79% of participants were willing to accept slower economic growth in favor of protections on the environment.[49] Projects such as the uranium mill run by Energy Fuels regularly experience protests and petitions from advocacy groups and tribal nations to cease its operations.[50] Additionally, while Utahns support the idea of reducing reliance on foreign imports for critical minerals, they still have a NIMBY (Not In My Backyard) mindset when mining projects come near their homes.[51]

Foreign Predatory Pricing

Foreign nations, predominantly China, have taken actions to create their monopolies on the critical minerals market.[52] China has taken actions to control the critical minerals, such as cobalt and lithium, by acquiring Chinese ownership in extraction and refining of those minerals in foreign states.[53] These actions also include Chinese government subsidies for domestic mining and refinery production costs, and price manipulation of critical minerals creating unfavorable market conditions for prospective and existing mining companies outside of China's influence.[54]

Domestic Processing

In 2025, the International Energy Agency (IEA) reported that China controlled on average seventy percent of the refining for nineteen of the twenty critical minerals the IEA tracked, which included copper, lithium, nickel, cobalt, graphite and rare earth elements.[55] Projections by the IEA and Benchmark Mineral Intelligence show China still controlling around sixty percent of the critical mineral refining in 2030.[56] Even with Utah hosting one of two domestic copper smelters, it still sends copper and byproducts, such as tellurium, to be refined by foreign countries before coming back to the US.[57]



Workforce Gaps

By 2029, more than half of the current domestic mining workforce (around 221,000 workers) will be retired and need replacing.[58] Since 2016, the number of US mining engineering graduates has fallen by thirty-nine percent.[59] Fourteen mining engineering programs across the US collectively graduated 162 students in 2023, falling short of the estimated annual employment demand for 400 to 600 mining engineering graduates. By contrast, China's forty-five mining engineering programs have 12,000 students enrolled and around 3,000 graduating annually.[60]

Recommendations for Utah

Accelerate Geological Mapping

In an interview with Dr. Simon Jowitt, he stated the US is "twenty years behind Canada and Australia" in terms of geological mapping data collected.[61] Thus, Utah needs to increase funding for geological mapping done within the state. Utilizing funds from the Critical Minerals Development Account, the Critical Minerals Council should prioritize the account's capital for the Critical Mineral Atlas and preexisting Earth MRI programs.[62] The state receives $87 million in mining tax revenue annually, of which a small portion could be put toward geological mapping.[63]

> **Using one percent of mining tax revenue, $870,000, would result in an overall economic return of $6.1 million to $8.7 million. A $100,000 investment from the Critical Minerals Development Account would result in a return of $700,000 to $1 million.**

Utah should simultaneously expand research partnerships with stakeholders such as local governments, universities, and mining companies to accelerate the physical process. Catching up to the amount of data held by foreign countries requires effort from all stakeholders to exponentially collect geological data.

Studies conducted by the American Geosciences Institute from 1994 to 2019 on the effect of geological mapping concluded that "every dollar invested in geologic mapping returned about seven to ten dollars in economic benefits, with a total investment of $1.99 billion fostering $20.61 billion in value."[64]

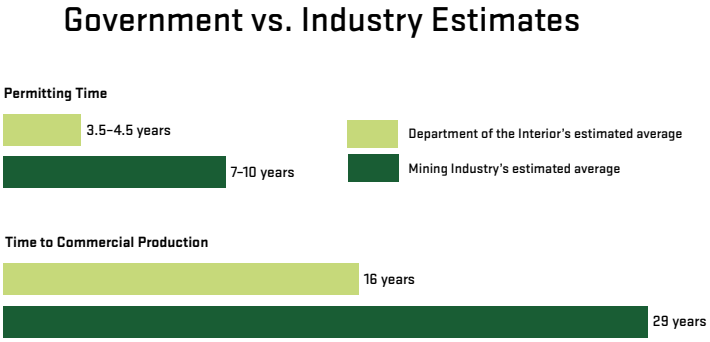
An additional study commissioned by Geoscience Australia and conducted by ACIL Allen Consulting to examine the benefits of geological mapping found that for "every dollar invested by GA in a project, the Commonwealth potentially gains a net benefit of at least fifteen dollars and potentially as much as $157," depending on the project.[65]

While geological mapping produces economic benefits for the mining industry, research shows it assists in addressing issues such as water resource management, and geochemical and health risks for citizens.[66] Geological mapping has a proven return on investment making it a stable asset to employ time and funding.

Comprehensive Examination of Mining Projects

The Critical Minerals Council should harness their oversight of government, academic, and market stakeholders to start research to evaluate all portions of the critical minerals mining process to properly ascertain what the biggest barriers are to mining projects becoming operational in Utah. There have been legislative efforts to evaluate the permitting process in Utah, but that cannot be the sole focus of the state.[67] In 2023, the Department of the Interior conducted studies concluding that the average permitting time in the US for mine operations was between three and a half to four and a half years and refuted the common industry claim that mining permits take seven to ten years in the US.[68]

Moreover, the Department of the Interior found "the length of time between the initiation of exploration for a mineral and the start of commercial production appears to be roughly sixteen years in the US, which is fairly consistent with the worldwide average."[69] This is in contrast to common studies cited by the mining industry saying the length of time for a mining operation to come online takes twenty-nine years.[70] Thus, with differing claims, there needs to be a concentrated initiative to properly evaluate Utah's complete mining timelines and barriers. Additional research demonstrating the workforce needs required by the mining industry in Utah would aid in securing the domestic critical mineral supply chain.



Environmental Issues and Public Concerns

Addressing the concerns of tribal nations, environmental advocacy groups, and the public is essential for successful growth of critical mineral projects. In 2024, the outdoor recreation industry generated $9.75 billion in economic value, employed 75,182 people across the state, and accounted for 3.3% of Utah's GDP.[71] Public polling reflects a desire by Utah citizens to continue to have access to the outdoors even at the cost of economic growth.[72] As such, while securing Utah's role in the development of the US critical minerals supply chain is important, sacrificing the long-term condition of the environment for short-term gains will not only have profound environmental impacts, but could harm the outdoor recreation economy within the state.[73]

The Critical Minerals Council should encourage mining companies to proactively engage with state and local stakeholders who are impacted by mining projects. Assisting in facilitating meaningful interactions between all the impacted stakeholders about the downstream effects of proposed mining operations and how to address valid concerns about the environmental impacts of mining would highly benefit the state.[74]

Research shows when the public is regularly involved in some capacity with quality communication and meetings on mining projects in their communities, they're more likely to accept mining projects rather than perpetually fighting against them, thus, shortening the amount of time it takes for a mining project to become operational.[75] Balancing mining expansion and proper care for the environment will ensure Utah continues to be a leader in both.[76]

Development of Processing Power

If Utah wants to implement a complete domestic supply chain of critical minerals, it must take steps to start hosting processing plants. Currently Utah and the US can't handle most of the refining of those critical minerals; the US still depends on China and other foreign countries to refine those resources.[77] Consequently, the Critical Minerals Council should use critical mineral zones and established tax credits to incentivize mining companies to build processing plants so the state and nation may control all aspects of the critical minerals supply chain.[78] Likewise, funds in the Critical Minerals Development Account ought to be used for generating investment and securing required infrastructure for these processing plants.[79]

Development of these processing plants must consider the amount of water and energy resources needed for the projects which are already under considerable strain in Utah.[80] Further research should be conducted to evaluate the methods by which China may attempt to manipulate Utah's markets to prevent further extraction and processing plants from being developed.

Alternative Extraction Methods

Utah should fund research on alternative methods of extracting critical minerals including recycling, e-waste, and mine waste. The Critical Minerals Development Account provides for funds to be used for research on critical minerals, making this a strategic investment.[81] There has been an increase in recent initiatives by the USGS and think tanks, such as the Council on Foreign Relations, to promote the expansion of these alternative ways to reduce reliance on China's supply of critical minerals.[82] These ideas range from recycling old technology which contain lithium batteries and rare earth minerals for new uses to evaluating past and present mine tailings for possible remains of critical minerals.[83] Publications from the Utah Geological Survey demonstrate additional interest in examining these alternative methods of retrieving critical minerals.[84] State focus on unlocking these sources will further secure the critical mineral supply chain along with creating more environmentally sustainable practices.

Conclusion

Critical minerals are essential to powering the everyday life for Utahns and Americans. Our access to these minerals is almost completely reliant on China, creating a high security risk for the US. Utah is home to roughly eighty-three percent of the critical minerals determined by the USGS and has the capability to become a domestic powerhouse in securing the critical minerals supply chain. The state government should seek to continue initiatives such as the Earth MRI program and Mission Critical while evaluating other methods to secure critical mineral projects in Utah.

If Utah and the US want to reduce reliance on China and expand their own critical mineral supply chains, policymakers must approach it with the understanding that these projects will take multiple years, if not decades.[85] It cannot be done within a year or two; it requires broad sustained support through all levels of governance.

"It cannot be done within a year or two; it requires broad sustained support through all levels of governance."

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