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America's Mineral Reserves

Unlocking Our \$12 Trillion Treasure Chest

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Never in history have the earth's mineral resources been so essential to human existence as today. America's future economic growth, as well as our energy and national security, is inextricably linked to being able to access and produce our mineral supplies. The sad irony exposed in this study is that even though America is richly endowed with untold mineral wealth, access to those minerals—especially on federal lands—has been extremely problematic for decades.

Three causes preventing access and production of our federal (and state) mineral wealth are: massive unrealistic permitting labyrinths, frivolous but malicious environmental lawsuits, and withdrawal of mineral-rich federal lands to prevent development. These are the primary reasons why America's domestic mineral production is at a tipping point, resulting in an unprecedented and dangerous over-reliance on China, Russia, and other dictatorships for the very minerals and energy that keep us free!

This study finds that:

The United States is blessed with some of the richest supplies of mineral wealth anywhere in the world. The total value of American domestic mineral reserves was estimated by the National Mining Association at \$6.2 trillion in 2017. We estimate that given the higher inflation and improved mining technology, those mineral resources are now worth closer to \$12 trillion. In addition, mining these minerals would raise up to \$1 trillion in revenues to the Federal Government. According to the U.S. Geological Survey (USGS), “mineral reserves” are that portion of an identified resource from which a usable mineral (or energy) commodity can at the present be economically and legally extracted. In other words, mineral reserves are minable now.

On the other hand, a “mineral resource” is a concentration of minerals for which economic extraction of a commodity is regarded as feasible, usually with the gathering of more information, and mining technology permitting. In other words, “mineral resources” are probably minable in the future.

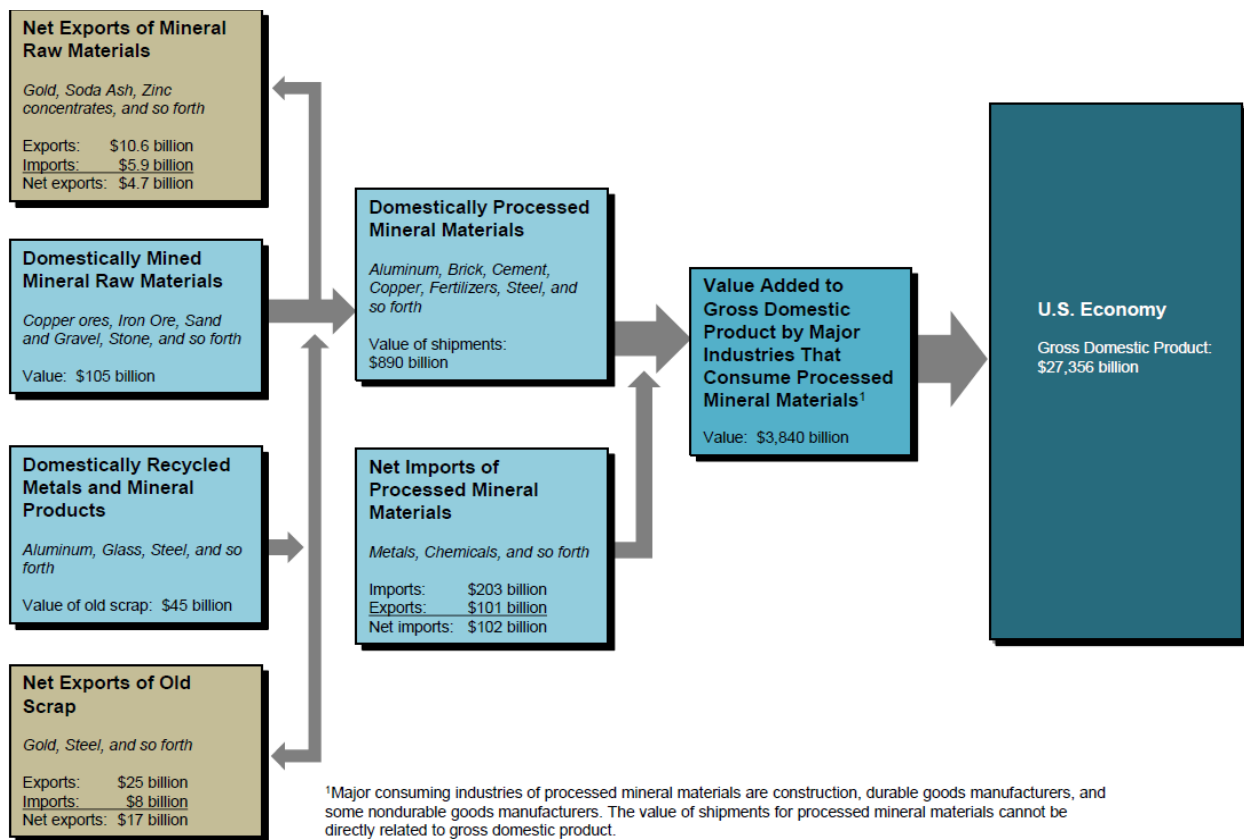
Therefore, if U.S. mineral resources on federal lands were only twice as abundant as mineral reserves (a very conservative estimate), then the value of our mineral resources might be reasonably estimated at \$12.4 trillion dollars, and possibility much more. A two times resource to reserve abundance/value scenario is very likely. Anything more is uncertain and is left to future mineral explorationists.

The value of minerals and the metals made from them is climbing due to lack of needed access as described above, and also due to the rising demand for many minerals and metals needed to feed, clothe, house, and provide technology to our 21st century world.

According to the U.S. Geological Survey's latest statistics (USGS 2024 Mineral Commodity Summaries), the various downstream value-adds by industries and sectors in the U.S. that consume minerals and metals is listed below:

- \$890 billion from domestically processed minerals materials such as aluminum, brick, cement, copper, fertilizers, and steel
- \$105 billion from domestically mineral raw materials such as copper ores, iron ore, sand and gravel, and stone

- \$102 billion from net imports of processed mineral materials such as metals and chemicals
- \$45 billion from domestically recycled metals and mineral products such as aluminum, glass, and steel
- \$17 billion from net exports of old scrap such as gold and steel
- \$4.7 billion from net exports of mineral raw materials such as gold, soda, ash, and zinc concentrates



- The value added to U.S. GDP (value chain) by industries or sectors that consume processed mineral materials (including metals) is roughly \$3.84 trillion dollars—a very significant portion (roughly 14 percent) of the \$27.3 trillion dollar GDP for the U.S. in 2023.
- Decades of misguided public policy (as described above and below) have severely limited access to this mineral wealth, especially on federal and certain state lands.
- Mineral and metal commodities are vital for economic growth, energy security, improving the quality of life, providing for national defense, and the everyday conveniences that are features of modern society, from cars to smartphones to electric stoves.

- America led the world in mineral mining output in the early 1990s. Today, the U.S. is not even ranked in the top 10 or 15 for the production of certain key critical minerals, despite being the world's largest consuming nation for minerals and metals.
- The United States has a dangerous dependence on foreign governments – including China and Russia – for imports of critical minerals and metals needed to sustain our economy and our national security.
- Smart new domestic mining policy on federal lands is needed. Policy improvements must include:
 - Overhauling and shortening lengthy permitting processes
 - Ending frivolous environmental lawsuits
 - Halting unwise withdrawal of mineral-rich federal lands—which limit domestic access and production of critical minerals and tend to create artificial domestic “shortages” which unnecessarily increases mineral imports
- Opening public lands to even more domestic exploration and mining will enable the United States to end our dangerous dependence on other countries for minerals, while also several trillions of dollars to the nation's gross domestic output.

Global mining investment in the U.S. has declined from 20% thirty years ago to 5% today. The nation cannot afford to leave valuable hardrock (critical) mineral deposits in the ground where their value is essentially zero.

Wise America First drilling and mining policies could raise trillions of dollars in leasing rights, income tax revenues, royalties and other revenue sources from within the energy and mineral domestic production value chains, over a sustained and extended period of time.

Misguided Mineral Policy and Missed Opportunities

The U.S. government owns and manages roughly 28 percent of the country's total land mass (equivalent to about 664 million acres of surface land and subsurface mineral rights). More than 90 percent of that land is in 12 Western states, and much of it contains world-class mineral deposits of massive economic significance, particularly in Alaska, Arizona, Utah, Idaho, and Nevada.

There is an extraordinary opportunity for the U.S. government to expand mining on these lands in order to establish or re-establish critical mineral supply chains needed for America's national security and economic stability. However, for several decades, Washington has failed to advance policies or plans to benefit from the domestic mineral treasure. The result?

Today, the United States is the world's only major industrial or G-20 country without three important needs: 1) a comprehensive mineral policy, 2) a reliable critical minerals stockpile policy, and 3) a bureau of mines or minerals.

The status quo of these three factors is a threat to America's economic security because critical minerals are being used in larger quantities than ever before across the U.S. economy—including telecommunications (cell phones, computers), energy systems (electric grids transmitting power from coal, natural gas, nuclear, and renewable energy), and green forms of transportation (battery-powered electric vehicles).

There is also a threat that energy, once generated, will not flow uninterrupted to end users because of critical mineral deficits in those supply chains—think copper, as an example. Critical mineral deficits, especially ones caused by foreign import trade restrictions or embargoes, is also a very tangible threat to the integrity of the nation's electrical grid, potentially compromising energy generation, transmission, distribution, and the supply chains beyond.

Even worse, the United States has an extreme dependence on foreign governments including China, Russia, and others—about 60 countries in all—for imports of minerals needed to sustain our economy and our national security. These imports include high demand “critical minerals” as well as “technology metals” including rare earth, lithium, graphite, cobalt, nickel, other battery metals – and even the uranium needed for baseline power generation. Chinese trade restrictions and embargoes of certain critical minerals has already begun in 2023 and continued into 2024.

Many of these imported minerals could and should be produced domestically. This is made possible when policymakers enact sensible regulations that incentivize investment in exploration, responsible mining, and state-of-the-art mineral processing, metallurgy, and mine site restoration. As an added bonus to our country and its work force—every one of these fields needs to be and is currently staffed by highly-paid professionals—who are in short supply to the companies that produce America's mineral resources, metals, and fuels.

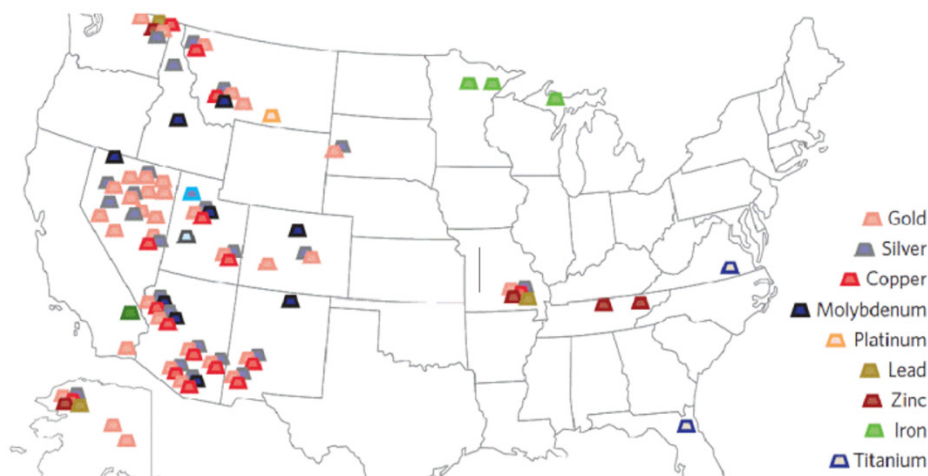
America's Mineral Riches

The total value of America's domestic minerals from mining and recycling non-fuel minerals was \$150 billion in 2023, according to the U.S. Geological Survey. And the total downstream value-added to the nation's gross domestic product (GDP) from major industries that consume those mined and recycled minerals and metals is roughly \$2.73 trillion dollars.

Mining and mineral/metal production value adds ripple through the economy by helping to create national “stepping stones” to prosperity. Eliminating as many “stumbling blocks” to mining and minerals processing and metallurgy wherever they exist could also help add hundreds of billions –if not a trillion dollars or more annually to the domestic GDP.

America's breathtaking energy and mineral resource endowments have provided for its inhabitants for over one-quarter of a millennia. Regarding energy, oil and natural gas production forecasts for the west Texas Permian Basin alone exceed the output of all OPEC countries combined except for Saudi Arabia. For almost a decade, Permian Basin production has grown more than production for any entire country in the world over the same period, including Saudi Arabia.

Similarly, the Western U.S. holds vast untapped mineral resources such as in the American Cordillera (Rocky Mountain chain), and also elsewhere in the mid-continent, Great Lakes region, and along all the coasts. This agglomeration of American mineral wealth is vast even on a global scale and is incomparable to any other belt or collection of mineral and metallic deposits on earth in its richness.



Major Metal Mining Operations in the U.S.

Source: U.S. Geological Survey

What Went Wrong?

As recently as the early 1990s, the U.S. was the leader in global mining and mineral production. Today, the country is not even in the world's top 10 or 15 mining economies for many important critical mineral categories. That's because America can't keep its mines open, or worse, it has difficulty approving and opening new mines. The result is that the raw materials for America's industrial and manufacturing needs – including national security – are gradually and increasingly unavailable.

How did this happen? There are several explanations, but a key one is that U.S. policymakers have chosen the easiest path to obtain critical minerals for the economy and national security: import them at cheap prices. This policy decision has badly undercut the domestic mining industry – and over the past 30 years the nation lost much of its capacity to mine, refine, smelt, or process minerals and metal because of a broad import everything—anti-mining agenda.

The final straw is that investment in U.S.-based exploration, mining, and processing of mineral resources has been chased away by over-regulation and an unpredictable mining permit labyrinth.

Anti-mining policies have infected all levels of government – federal, state, and local. Emblematic of the turn against mining was the shuttering of the federal government's Bureau of Mines in 1996. The Bureau, which was part of the Interior Department for 85 years, was the federal government's lead agency on mining and mineral processing research and critical mineral worldwide forecasting.

Other factors contributing to critical mineral vulnerability have been limitations on federal land access, the length of time required for mineral exploration, mine permitting, and mine construction, and the less than adequate status of the nation's critical mineral reserves and stockpiles.

The net effect has been to increase the fragility of mineral exploration and mining sector investment – a tragedy in an otherwise abundant and mineral resource-rich nation. As the need for critical minerals continues to increase, the U.S. mining industry, through no fault of its own, has been somewhat unable to meet increased demand, especially in the face of long-term mining related policy problems. Unfortunately, the unending supply of cheap mineral imports is also a deterrent to strong domestic mining.

There is a consensus in the mining and minerals industry regarding the barriers that need to be overcome to stay competitive. The major obstacles to progress include:

- Permitting labyrinths for exploration and mining
- Environmental, regulatory, and legal hurdles and standoffs over land use
- Disinformation campaigns by foreign entities against U.S. mining and mineral production
- Land withdrawals and restricted access to mineral-rich lands

Regulatory and policy decisions affecting exploration and mining of previous administrations (both parties) need immediate attention from the incoming Trump administration. However, regardless of which administration is in power, the importance of American mining, just like energy, demands good stewardship. Minerals need to be mined – not undermined! The country wins by using domestic mineral resources for economic stability and national security, while leaving the environment in better condition than it was found.

The Problem of Excessive Regulation

Miners face a thicket of burdensome regulations as they seek federal, state, and local permits for exploration plans, drilling plans, mine plans, reclamation plans, and a myriad of other related and unrelated activities. These regulations have contributed to the sharp decline in U.S. mining output over the past 30 years.

Meanwhile, Canada and Australia have environmental regulations and permitting as stringent – and maybe more so – than the U.S. But their time requirements are just 2-3 years for permitting, compared to 7-10 years minimum in the United States.

If the U.S. government eliminated the wasteful years-long or decade-long delays in permitting and scheduling that hamper exploration and mine construction, mining output then its subsequent contribution to GDP would likely soar and our dangerous dependence on mineral imports would begin to fall.

Reducing mine-related permitting complexities would also attract significantly more investment dollars to the U.S. Those willing to finance mining projects at reasonable terms *require* a return on their investment in a time certain—something the U.S. used to routinely deliver.

For example, in 1997, 20 percent of global mining investments were in U.S. domestic mining projects. But by 2023, less than five percent of global mining investment was made in the U.S. By comparison, Canada's share of global investment in the past decade is approximately twice or three times the amount invested in U.S., in large part because Canada's mine-permitting approval process is predictable and trust worthy.

The existing long permit approval process puts considerable pressure on the U.S. mining industry. According to the U.S. Geological Survey, only 14 major metal mines started production in the U.S. from 2000-2015, or less than one per year. The length of time from the start of permit application to commercial production ranges from a minimum of 6 years to a maximum of 23 years, with an average of 10 years. These figures *exclude* pre-permitting exploration, environmental baseline studies, and feasibility studies, which can often take 10-15 years or more.

In the past four years, reduction and elimination of mining approvals, cancellation of existing leases and claims, and closure of existing mines has ushered in an era of “*negative mining*”, i.e. mines are being closed rather than opening in the U.S., especially on mineral-rich federal lands.

The result of mining delayed and mining denied is decreased private financing for mining, and even less funding for exploration because its return on investment is even further into the future. (Notably, venture capitalists – who habitually fund some of the riskiest technology start-ups – largely avoid investing in mining). The U.S. mining sector is losing out on capturing the foundation of this century's wealth creation by a minerals/metals/technology-based economy.

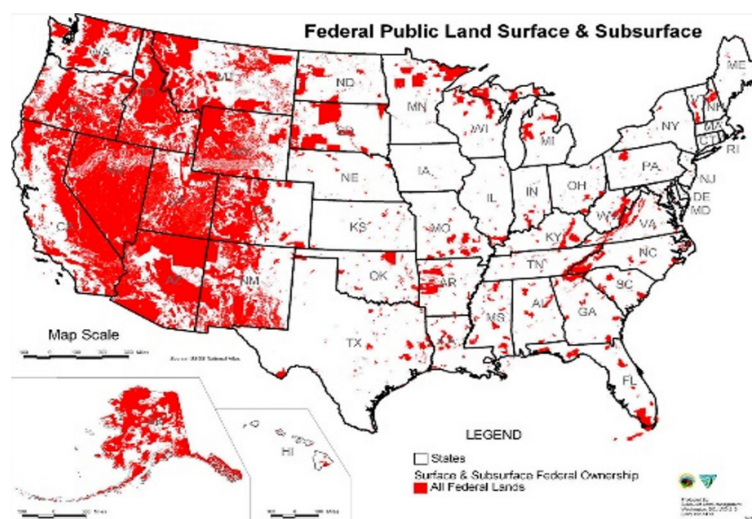
Reckless Land Withdrawals

The federal government can prevent mining on federal lands – for environmental, cultural, or recreational reasons – a process known as “land withdrawal.” The reckless use of withdrawals has led to probably half of the nation’s federal hardrock minerals being off limits for development, mainly in the twelve largest mineral-rich Western states (i.e. the Rocky Mountain Cordillera). This causes a disproportionate restriction of access to critical minerals because the Western states account for 75 percent of all U.S. metals mining—mostly on public lands—according to the National Mining Association.

By the mid-1990s, 71 percent of the total federal acreage was then off limits to mineral exploration and production activities. Those acreage figures continued to creep higher until 2017, when the Trump administration stemmed the increase and started to reverse the process of federal land withdrawals. An October 2017 decision to scrap a withdrawal enabled exploration and mining to proceed over an area covering parts of six Western states.

The consequences of withdrawing federal lands from mineral exploration and mining have not been fully appreciated by policymakers because the results of their decisions – and those of their predecessors – may take decades to be felt. But past withdrawals were implemented without taking a comprehensive approach to resource management. Today, the nation is feeling the cumulative effect of all previous withdrawal actions as mineral imports hit record highs year over year because of the steep decline in domestic mining on those federal lands.

Instead of withdrawing even more federal lands, the U.S. could better compete with the world’s other mining economies—and better supply its own economy—by opening public lands to increased domestic exploration and mining. This would translate into additional minerals, discovered and produced, a stronger manufacturing base, and a more secure national defense. Today’s technology used in environmental restoration of mined land would help make this possible. Otherwise, thoughtless land withdrawal creates an ongoing risk of artificial shortages, setting up the need to import those same resources instead—much of it from countries adversarial to the U.S.



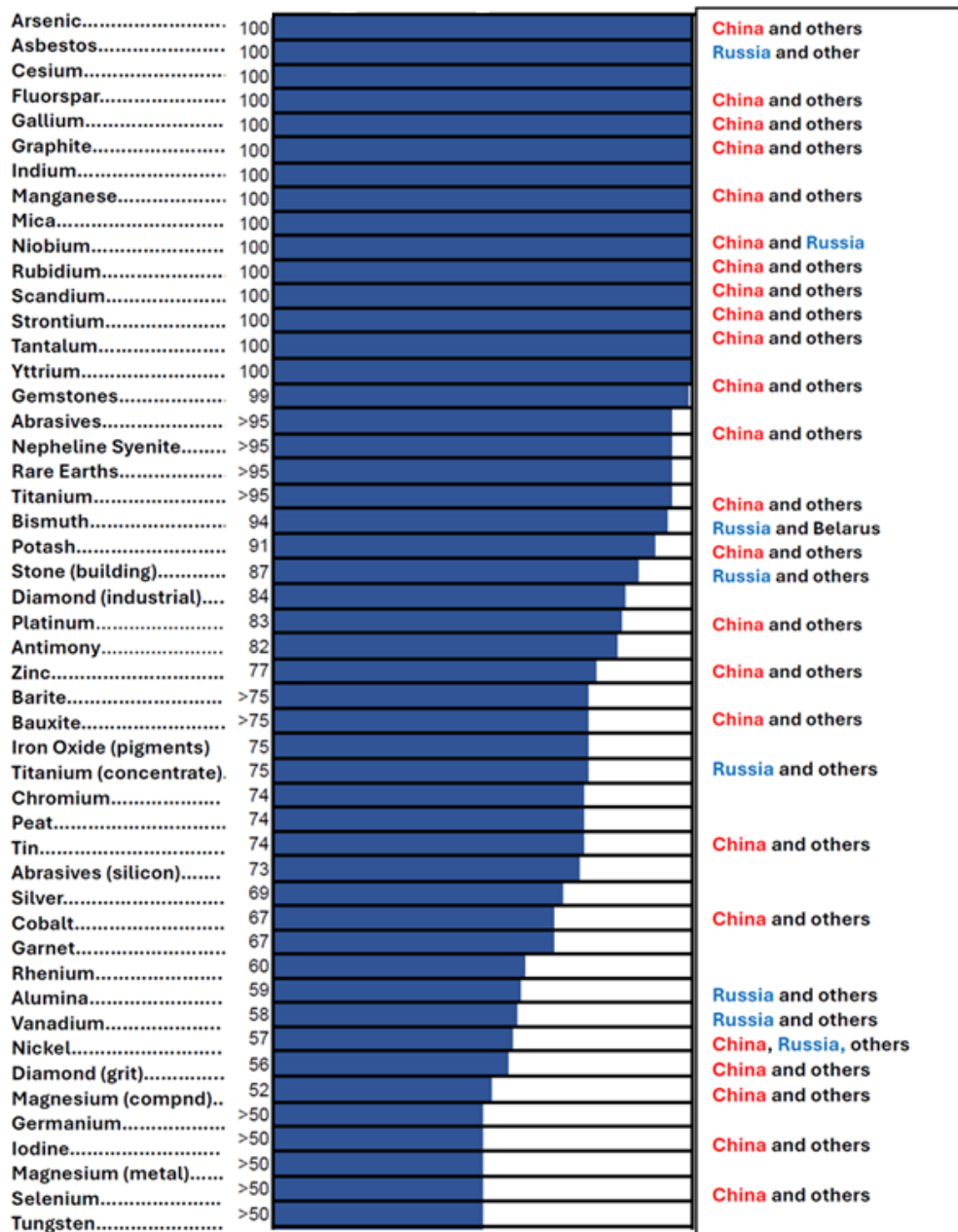
Areas of Federal Land Management

Source: Bureau of Land Management, Congressional Research Service

A Dangerous Dependence on Imported Minerals

Mineral and metal commodities are vital for economic growth, improving the quality of life, providing for national defense, and the overall functioning of modern society. Yet the United States is mineral resource *insecure*, relying on imports for more than one-half of the U.S. apparent consumption for 49 nonfuel mineral commodities and 100 percent import dependent for 15 of them, according to the Mineral Commodity Summaries report, published by the U.S. Geological Survey in January 2024. (see figure below)

Sources of Critical Mineral Imports to the U.S. > 50 Percent Reliance
Imports from China in **Red** and from Russia in **Blue** (source: U.S. Geological Survey)



The USGS Mineral Commodity Summaries report underscores the dependence and vulnerability:

- Of the 50 mineral commodities identified in the “2022 Final List of Critical Minerals,” the U.S. was 100 percent net import reliant for 12, and an additional 29 critical mineral commodities had a net import reliance greater than 50 percent of apparent consumption.
- China was the leading source of mineral commodities with a greater than 50 percent import reliance providing 24, with significant imports of other essential commodities also coming from Russia and other dictatorships.
- The estimated value of U.S. metal mine production in 2023 was \$34.9 billion, relatively flat compared with the \$34.7 billion in 2022. In 2023, the capacity utilization for the metals mining industry continued a five-year downward trend ending at just 59 percent utilization.

These figures are a painful reminder that the United States has ceded leadership of our technology metals supply chain future to countries who carefully control and leverage their own critical mineral exports to the U.S.—particularly what is needed for our defense, renewable energy, and tech industries.

Perhaps most worrying, China is the number one supplier of the minerals (particularly “critical minerals”) the U.S. economy needs for the 1) energy, 2) manufacturing, 3) technology, 4) transportation, 5) infrastructure, and 6) defense sectors.

In 2023, China trade restricted gallium, germanium, and graphite. Gallium is a key component of computer chip manufacturing, germanium is used in 5G technology, and graphite is used for numerous green technologies, especially battery storage, and also military applications. Other trade restrictions and actual embargoes continued into 2024.

Trade restrictions and embargoes of critical minerals against the U.S. are likely to continue because China and other countries do not want the U.S. to be self-sufficient in critical minerals and other materials needed for economic stability and national security. This provides leverage *for* the critical mineral exporting countries who are only too happy to feed the huge U.S. appetite for critical minerals needed for manufacturing, until the exporting countries decide when to restrict and possibly embargo—making the U.S. manufacturing sector extremely vulnerable.

This presents a massive vulnerability for America’s energy system, especially the electric grid. Restricted access to only a handful of critical minerals and metals required to build, maintain, and expand the energy system’s infrastructure could cause enormous problems for the grid. If China, Russia, or another trading partner were to restrict or embargo certain select critical mineral/metal imports to the U.S., can our power grid or entire energy system successfully adapt? Probably not, largely because of the almost three-decade decline in U.S. hardrock mining has translated into, few new mines being opened, and minerals/metals needed for the grid have not been stockpiled.

What Should be Done to Rebuild America's Mineral Supplies?

Over the past 30+ years, there's been a sharp erosion in America's mineral security. This problem cannot be overstated because *mineral security is national security*. There's now a critical need to develop a well thought-out mature mining and minerals policy—comparable to other nations with successful mining economies—in order to bring our mineral import over-reliance under control. Much more needs to be done to get on the path to mineral independence.

Streamline permitting

Immediately adopt for use, where possible, the most efficient permitting practices used anywhere in the U.S., such as those used in Nevada, Utah, Wyoming, and other successful mining states. In addition, study and adopt where possible the best examples of efficient permitting policies now being used in the world's most successful and environmentally-friendly mining countries such as Australia, Canada, Sweden, and others.

Both sets of permitting best practices – domestic and international – should be combined, codified, and phased in for use by federal land management agencies, perhaps on a regional basis. Insisting on a system of federal permitting upgrades using domestic and worldwide best practices, as specifically called for EO 13817, needs to result in a practical, efficient, certain, and time-limited system of permitting that is far superior to what is now in place.

Rethink stockpile capabilities

Request the Director of the Defense Logistics Agency (DLA) to strictly incorporate Executive Orders 13817, 13953, and 14017 into a new working understanding of which minerals are absolutely critical to national security – using new and additional feedback from the civilian departments and agencies involved with critical minerals. This will enable them to carefully plan the selection and volume of minerals and metals for inclusion in the future stockpile management with no more than a three-year time horizon.

Also, instruct the DLA to ensure that all future agreements include more emphasis on assurances of domestic capacity for mining, processing, and transporting all critical minerals—along the entire minerals supply chain—from mine to the manufacturers who need them. Request DLA to avoid reductions in the stockpile of those minerals and metals that may have dual-use for military and civilian applications, especially those for which the nation is heavily import-reliant.

Focus on import alternatives

An “import only” mindset especially for critical minerals has a steep downside—there is no fallback during a supply chain disruption. Our trading partners and Western allies’ industrial and tech economies have many of the same import issues; policymakers should not presume our nation can import its way out of this very real “national security problem” caused by dwindling domestic mining output.

There are several options to reduce vulnerability, which include the following:

- Establish as many trading partners as possible, who would be willing to create an alliance to trade minerals the U.S. is not producing, in exchange for minerals the U.S. has in abundance
- Find substitute or replacement minerals and metals through research
- Understand how long each stockpiled mineral/metal will last in an emergency and determine how to increase the stockpile by leveraging U.S. mineral wealth on federal lands
- Identify which critical minerals are not stockpiled, why not, and how to obtain those minerals and metals
- Expand conservation and recycling programs for specific minerals, perhaps as a nationwide popular goal
- Increase domestic mining, especially on federal lands

Restoring America’s Mineral Security

To support and defend the world’s largest, technology-based, environmentally friendly, and free economy, we must redesign the existing domestic mining permitting and regulatory gauntlet in order to enable the free market to produce the critical minerals and metals that America needs now. Without reliable mineral supply chains, the nation can neither insulate itself from the impacts of global conflict nor protect its domestic interests.

*Just as the U.S. achieved energy independence, we now need to reestablish
American mineral independence.*

The fabric of existing American mineral resource and environmental law—coupled with a technologically robust mining industry populated by the world’s best geologists, mining engineers and environmental scientists—can ensure our air, water and wildlife are properly protected, while safeguarding our economic stability and national defense. The time to start making progress toward that goal is now!

