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Mineral Competition in Great Power Conflict: A Security-Focused Approach to Critical Mineral Policy

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EXECUTIVE SUMMARY

As America and China move towards “great power conflict,” American policymakers must prioritize reliable access to critical minerals. These minerals, including cobalt, lithium, nickel, and rare earth elements (REEs), fill essential roles in technology, energy, and defense sectors as raw materials for microprocessors, magnets, batteries, superalloys, and superconductors.¹ As a result of the push for lower energy emissions and the rise in concerns about security manufacturing in the aftermath of the Russo-Ukrainian War, demand for these minerals is expected to rise by between 100% and 350% by 2030.² Yet America plays a negligible role in the critical mineral market. China is the largest refiner of critical minerals in the world, refining nearly two-thirds of the world’s cobalt, copper, and lithium, and nearly 90 percent of the world’s REEs. China, therefore, holds a massive advantage over the United States in a sector likely to define much of the global economy and one which is essential for America’s national security. To overcome this disadvantage, America must implement policies to build up the domestic critical mineral industry, build up its critical mineral stockpiles, and support “friendshoring” of mineral production to allied countries.

Among policy thinkers in the critical minerals sphere, two main schools of thought exist: those who argue for reliance on market mechanisms or international cooperation to ensure America will continue to have access to these minerals, and those who believe that mineral access will become a tool of great power competition. The former school tends to emphasize the role of those minerals in a clean energy transition to combat the global threat of climate change, while the latter emphasizes the defense applications of the minerals. Although scholars debate the usefulness of the “great power competition” framework, two facts are certain: foreign policy voices of both parties are committed to the framework, and critical minerals will remain a vital U.S. interest either way. Therefore, this paper will examine America’s strategic dilemma in the mineral sector through the lens of competition with China.

Within the framework of U.S.-China security competition, security concerns will take precedence over normal economic incentives and international cooperation cannot be expected with any certainty. Therefore, America should prepare for interruptions in the global critical mineral supply from China, potentially threatening defense manufacturing. Market forces alone cannot provide for America’s security needs because of the infrastructure costs and development time which critical mineral refining requires. In the event of a conflict with China, defense mineral needs will far outpace current capacities as they did in previous American wars. Therefore, American security requires a stronger mineral policy.

Great Power Competition

Scholars debate the usefulness of the “great power conflict” framework for analyzing the U.S.-China relationship. However, it is clear that the United States and China are currently engaged in competition for hegemony, for better or worse, and this fact must be at the core of any effective mineral policy.

Although the Modern Warfare Institute observed that there is no single authoritative definition of “great power conflict,” for the purposes of this paper it will be defined as a zero-sum conflict between two potential hegemonies in which both sides view hegemony as necessary for security.³ This sort of conflict is, at its heart, concerned with military power, as it is driven by security concerns. However, other forms of power exist, some of which also serve essential military functions, such as economic power. Great power conflict, therefore, includes all potential ways of weakening the opponent and strengthening one’s own side.

Not all foreign policy thinkers accept the great power conflict framework at all. Stimson Center Senior Fellow Emma Ashford, writing in *Foreign Policy*, described it as “a new, poorly theorized model of the world and of America’s place in it” with the potential to endanger American security.⁴ Although admitting that “As a description, great-power competition is accurate; competition among the great powers is a defining feature of the international environment,” Ashford argued that the resurgence of great power conflict language has become a justification for commitment to foreign conflicts. Defenders of the framework, for Ashford, “are still unclear on why we should pursue an existential Cold War-style struggle with China, rather than a more measured approach of competitive coexistence.” Therefore, she opposed use of the term, favoring approaches which promote cooperation where possible.

John Mearsheimer, however, considered great power conflict to be an unavoidable albeit tragic reality of international relations. In *The Tragedy of Great Power Politics*, he wrote that “Great powers that have no reason to fight each other—that are merely concerned with their own survival—nevertheless have little choice but to pursue power and seek to dominate other states in the system.”⁵ He saw this scenario as

the natural trajectory of U.S.-China relations as a result of Chinese economic development, ruling out the possibility of true cooperation: “Unfortunately, a policy of engagement is doomed to fail. If China becomes an economic powerhouse it will almost certainly translate its economic might into military might... In short, China and the United States are destined to be adversaries as China’s power grows.”⁶ In Mearsheimer’s framework, America’s and China’s security concerns force them into competition for regional hegemony in Asia, as well as economic and military competition in general.

This paper will assume Mearsheimer’s framework for great power competition. Although Ashford’s concerns are warranted, by her own admission both parties have endorsed the great power conflict formula, so that sort of conflict is likely unavoidable. Therefore, responsible policy requires preparing for the worst eventualities, including the possibility of war or other forms of conflict. Recognizing the potential for war is not inherently pursuing a hawkish policy, and ensuring America’s defense needs in critical minerals are met assumes only the former.

The Need for a Critical Mineral

Strategy

Not all policy analysts agree on the need for proactive critical mineral policy. Some theorists of a more libertarian bent, including restrainers such as Dr. Eugene Gholz of the University of Notre Dame, have argued that no critical mineral strategy is necessary at all, and market mechanisms will resolve any crisis of supply. However, this approach fails to account for the inherent difficulties of critical mineral production, as well as the volume of minerals which would be required in a short time if war broke out. The realities of the critical mineral industry necessitate immediate and proactive government mineral policy.

Gholz, writing in a report for the Council on Foreign Relations, argued that market forces could deal with any disruptions to the critical mineral industry. Discussing the 2010 rare earth minerals crisis, Gholz wrote that there was a “largely successful market response” and that “even in the apparently most-dangerous case of rare earth elements, the problem rapidly faded—and not primarily due to government action.”⁷ Gholz claimed that market competition

for mineral supply would undercut China's supply dominance, while innovation to decrease dependence on minerals with threatened supply would decrease American demand. After such a market readjustment, he argued, redirecting supply from civilian to military use would eliminate any remaining national security threat posed by Chinese dominance of critical mineral markets.

Given the difficulty of increasing critical mineral production in response to a crisis in addition to the projected increase in defense demand in the case of a long-term conflict with China, a proactive critical mineral strategy is necessary. The Defense Logistics Agency identifies a wide range of minerals essential for defense, including cobalt, nickel, tungsten, and gallium.⁸ These minerals, along with certain rare earths, are essential components to defense technologies such as precision-guided missiles, smart bombs, electric ship drives, command and control centers, and aircraft, tanks, and missile systems.⁹ While market mechanisms can yield efficient outcomes, the specific case of these minerals presents unique challenges that market mechanisms cannot resolve.

According to a report by the Congressional Research Service, complex systems such as naval vessels and aircraft can require massive volumes of such materials: "Each SSN-774 Virginia-class submarine would require approximately 9,200 pounds of rare earth materials, each DDG-51 Aegis destroyer would require approximately 5,200 pounds of these materials, and each F-35 Lightning II aircraft would require approximately 920 pounds of these materials."¹⁰ In addition, Mark Cancian, senior adviser at the Center for Strategic and International Studies (CSIS), argues that historical precedent shows that the United States could be reduced to two of its eleven armored brigades within the first nine months of a great power conflict, and suffer similar rates of attrition in aircraft and other systems.¹¹ These losses would require a massive increase in critical mineral supply just to maintain the American military at its current size. Supplying enough critical minerals to sustain a wartime expansion of the U.S. military, therefore, would be another heavy lift entirely.

America's mineral supply is dominated by foreign imports, especially from China. According to a report by the United States Geological Survey, as of 2014, America is 100% dependent on imports for 19 non-fuel mineral commodities and over 50% dependent for

another 47.¹² China is the main source of supply for 24 of those non-fuel minerals, while Russia provides another eight. According to a Wilson Center report, China currently refines 64.7% of the world's cobalt, 61.8% of copper, 35.3% of nickel, and 87.1% of REEs; Russia produces another 6.7% of copper and 6.4% of nickel, while America is only a major refiner of copper at 6.9% of global supply.¹³ In addition, China accounts for 94% of all rare earth oxides.¹⁴ Given producer countries' own consumption and defense needs, it is unlikely America could acquire the volume of minerals it would need to match the rate of attrition in a conflict if China cuts off its mineral exports. Gregory Wischer and Jack Little, writing for *War on the Rocks*, noted that the current National Defense Stockpile lacks the essential minerals that would be needed in the event of a conflict with China, writing that

if the model assumes that the U.S. government can rely on U.S. partners quickly ramping up metal production, it will overestimate supply access. This overestimation is because technical challenges often plague refinery commissioning and ramp-ups, delaying production and causing production to be under capacity.¹⁵

Bentley Allan, Noah Gordon, and Cathy Wang, writing for the Carnegie Endowment for International Peace, noted that "Even aggressive growth in the mining sector would leave democratic countries drastically short on critical minerals supply," and therefore advocated cooperating among democratic countries for "an unprecedented build-out of the mining industry."¹⁶ Shifting mineral supplies from civilian to military application, even if that could be accomplished with relative efficiency, would therefore only account for a small amount of the needed supply in the event China cuts off the existing supply chains.

Therefore, market solutions would, in the event of war, leave the American military without the raw materials it would need to recover from attrition, crippling America's defense capabilities within months. This situation would continue for several years until non-Chinese supply lines are developed. Therefore, America should shortcut that process and begin building those supply lines now in order to ensure American security.

The Restraint Case for Mineral

Security

A security-focused mineral policy would advance the cause of a restrained foreign policy. Resource dependence has historically led to war rather than prevented it, especially when those resources are essential for a nation's security concerns. Meanwhile, a buildup of defense-critical supplies and production will not likely increase the likelihood of war, but would instead remove American motivation for war while deterring China.

On one hand, dependence on China for resources could back America into a corner where it is forced to choose between abandoning its security goals or war with China; Japan in the Second World War and America's oil wars provide historical examples of this phenomenon. Meanwhile, Chinese dominance in critical minerals could embolden China to weaponize its market power, in the process escalating tensions. Recent Chinese actions demonstrate that this is an ever more likely possibility. Policymakers should therefore embrace defense mineral independence as an instrument of restraint.

Japan, 1941: a Model for Resource Wars

The example of Japan in the lead-up to the Second World War shows how resource dependence can place a nation in a situation where war becomes inevitable. As Stanford professor Scott Sagan wrote,

The persistent theme of Japanese irrationality is highly misleading, for, using the common standard in the literature (a conscious calculation to maximize utility based on a consistent value system), the Japanese decision for war appears to have been rational. If one examines the decisions made in Tokyo in 1941 more closely, one finds not a thoughtless rush to national suicide, but rather a prolonged, agonizing debate between two repugnant alternatives.¹⁷

These alternatives- war with America or the abandonment of their hegemonic security goals- were defined by Japanese oil and mineral dependence on America. According to a RAND Corporation study,

Japan became totally reliant on imports of energy and at least thirteen key raw materials.

Fearing that their industrial progress would be reversed, Japanese leaders conceived of the Greater East Asia Co-Prosperty Sphere, dominated by Japan, as a way to deal with this challenge.¹⁸

In particular, Japan relied on America for eighty percent of its defense-critical oil for their nascent navy and air force.¹⁹ The original conflict between Japan and America revolved around concerns of regional hegemony, but oil security concerns forced the issue, forcing Japan to choose between war and abandoning their national goals.

Japan's dilemma in the years preceding 1941 parallels the United States' situation vis a vis China today. Current American security strategy demands hegemony in the Pacific, Europe, and the Middle East as critical, and even if those interests were scaled back, it would still be in America's interests to prevent Chinese hegemony. As Mearsheimer wrote, these concerns inevitably place the United States and China in conflict.

At the same time, modern American resource dependence is as bad if not worse than Imperial Japanese dependence on America was. Again, China produces a majority (up to 94%) of many critical minerals, including some for which America is entirely import-dependent. Without access to these minerals, America cannot provide for its own security concerns at home or abroad, or project its power in the way it hopes. Threats to that supply chain, therefore, could place America in the same bind Japan once faced: give up national ambitions and security concerns, or go to war with a superpower.

American Resource Wars

In addition, America has shown willingness to use war as an instrument to secure foreign resources in the recent past. Jeff Colgan at Brown University has written that, while simple claims of "resource wars" are often exaggerated, the oil industry of the golden age of oil (1973-2003) still led to wars through several pathways. He identified concerns about market concerns, the political effects of oil dominance on producers, and consumer access concerns as ways in which the oil industry led to wars, arguing that "between one-quarter and one-half of interstate wars since the beginning of the modern oil age in 1973 are connected to one or more of these oil-related causal

mechanisms.”²⁰ Among the most notable examples of American wars where resources played a role were the 1991 and 2003 wars with Iraq, which scholars such as Farzana Noshab have noted were driven by oil access concerns as well as security concerns.²¹

America’s oil wars were not inevitable because America had the potential to control its own oil supply. The United States led the world in oil production for the first three quarters of the twentieth century, producing two-thirds of the world’s oil in 1945 and remaining the largest single producer until 1973.²² However, American oil imports began to rise after 1970 as consumption increased and production stagnated, forcing America to become ever-more dependent on foreign oil, including oil produced by hostile powers.²³

Since the Reagan era, free trade economics have dominated Washington, and the American domestic oil industry has lost its once dominant position. As a result, by the 1990s and 2000s, oil security became a primary concern of policymakers. A turn to promote American domestic energy independence would likely have decreased the need for war during that period.

Concern about oil during the end of the twentieth century and the beginning of the twenty-first parallel those about critical minerals now. Foreign dependence on critical minerals, essential as they are for defense and other key areas of the economy, especially in the age of microchips, clean energy, and smart weapons, will provide the same sets of incentives which led the United States into war in the Middle East.

One key difference, however, is that China is far more economically, militarily, and diplomatically powerful than Iraq ever was. A war with China, even if only localized proxy wars, would be far more destructive and costly than American involvement in the Middle East, and acquiring the needed resources to win such a war would be a much less certain project. Therefore, the stakes of mineral independence exceed those of oil.

Chinese Mineral Threats

At the same time, as tensions between the United States and China rise, China will have a growing incentive to weaponize its market control. China first experimented with this strategy in 2010 by restricting REE access for Japan (with limited success, as Gholz points out), but in more recent times, China has shown

a greater willingness to return to that strategy.²⁴ In the latter half of 2023 alone, China has placed export restrictions on three minerals – germanium, gallium, and graphite – in retaliation for American attempts to develop a domestic semiconductor industry.²⁵ The Chinese Communist Party’s (CCP) official newspaper *The People’s Daily* has made clear China’s willingness to weaponize minerals in a conflict with the United States.²⁶

These actions escalate tensions between the two countries, yet as long as America remains dependent on Chinese minerals, they will remain part of the Chinese toolbox. Despite potential long-term dangers of escalation, the short term disruptive power of export controls, including potentially more extreme controls, continue to provide incentives for China to use them. If America were resource independent, however, it could deter these weaponizations, preventing unnecessary escalation.

A Resource Strategy for Peace

Skeptics may argue that defense material and manufacturing buildup could exacerbate conflict between the United States and China. Michael Wallace, for example, argues that arms buildups predict wars in ninety percent of cases; however, Paul Diehl casts doubt on Wallace’s methodology.²⁷ Henry Kissinger, on the other hand, wrote that “To be sure, my reading of history did not support their view that all arms races caused tensions; arms buildups, historically, were more often a reflection rather than a cause of political conflicts and distrust.”²⁸ Realist scholar Charles Glaser argued a similar point, writing that “If a state’s security environment necessitates an arms buildup, then arming, as well as the competition that ensues if its adversary responds, is rational and the state’s best policy option. Even if arms races correlate with war, they do not cause it.”²⁹ If even arms buildups do not cause wars, far less so will buildups of material and manufacturing capability which also serve non-military functions.

Proponents of strategic restraint, therefore, should pursue a policy of defense mineral independence. Increasing domestic supply and production of defense-critical minerals will not itself lead to war, but history shows that leaving in place America’s mineral dependence on China might. Securing supply chains of minerals needed for national defense manufacturing will not only safeguard American security in the event

of a conflict with China, it will also help decrease the risk of such a war breaking out in the first place. By avoiding dependence on China for resources needed for American security, America will avoid at least one pathway which can lead to war.

Mineral Strategy With a Security

Focus: A Blueprint

Focus on Defense

In recent years, the growing salience of the critical mineral issue has generated bipartisan attention and a wide range of policy proposals. These include “friendshoring,” stockpiling, recovery and substitution, and increasing domestic supply. These strategies, however, have generally not discriminated between defense-critical minerals and energy transition minerals.

America is faced with a future where demand for critical minerals in both civilian and defense sectors spikes while the supply chain runs an ever-greater risk of constriction. Accordingly, it will be more essential than ever for America to secure its most critical and endangered supply chain: defense manufacturing. Therefore, America should narrowly tailor its critical mineral strategy towards defense minerals, such as cobalt and nickel, ensuring access to those minerals in the short, medium, and long term.

Defense-critical minerals face the greatest challenges both of supply and demand in the case of a conflict with China. While securing the energy transition remains a political and economic priority, Washington should prioritize security-focused minerals. As a RAND Corporation report stated,

Neither the United States—nor any other country—wants its national security needs to be in competition with its future climate security. But if both necessities are competing for too little raw material, the price pressure on these commodities and specialty chemicals could be damaging to both endeavors.³⁰

Gholz’s criticisms of active mineral policy hold true outside of a defense context; non-defense minerals such as lithium do not require the same degree of attention, despite their essential role in the energy transition. Prioritizing defense minerals would not

necessarily threaten the energy transition either; many defense-critical minerals also have energy applications, such as cobalt and nickel. Energy-based domestic consumption would provide essential markets needed to develop and sustain the industry capacity needed for defense supply in case of a conflict.

Achieving Mineral Independence

Given the security threat posed by reliance on China for critical minerals, America should take action to secure its defense-critical mineral supply chain. In the short term, America should ensure it has enough minerals in reserve to ensure defense manufacturing can meet the challenges of the first months of a war. In the long term, meanwhile, American policy should prioritize securing access to raw critical minerals and developing the means to refine them. The ultimate goal should be mineral independence from China; until that is achieved, critical minerals will continue to be a vulnerability for American national security.

The first priority of American mineral policy, to protect against short-term threats, should be expanding the American critical mineral stockpile. Wischer and Little outlined strategies for such a stockpile, arguing that the stockpile should be expanded to fulfill three years of American domestic demand.³¹ They note that the Chinese strategic reserve contains 7,000 metric tons of cobalt, compared to only 300 metric tons for America. In 1990, by contrast, the American stockpile included 24,000 metric tons of cobalt. Wischer and Little advocate increasing the mineral stockpile to sufficient levels to last three years, prioritizing domestic sourcing.

To accomplish this goal Wischer and Little propose producing what America can domestically or in friendly countries, but also covertly purchasing larger volumes of Chinese minerals for the stockpile. Increasing the size of the stockpile would also require an increase in storage space, requiring further Department of Defense investment.

Stockpiling, however, would only provide a short-term safety net. Long term defense-mineral supply security requires investment in the necessary technology, skills, and infrastructure to refine critical minerals at home and in friendly nations. The startup costs for mineral refining are high, inhibiting market-based solutions, so building up American mineral refining

will require substantial government action. The Biden Administration has already announced \$150 million in critical mineral refining, helping companies such as Westwin Elements begin construction on refineries, but, this investment should be expanded to accelerate the process and increase its scale.³²

Beyond subsidies, the federal government should protect the domestic mineral industry by placing protective tariffs and import duties on mineral imports, especially from China and other rivals. Although China would likely respond with their own tariffs, the American trade deficit is so high, especially in the tech sector, that the effects would be minimal.

Combined with streamlining environmental and economic regulations to ensure American companies can produce minerals at low cost, these measures will help develop the American mineral industry to be competitive in growing foreign and domestic mineral markets as the energy transition advances. In the process, the infrastructure to provide for defense needs can develop while achieving environmental goals. These measures should focus primarily on minerals necessary for defense in order to ensure efficient use of resources, even as they also contribute to energy transition goals.

Even these measures, however, will fail to secure American defense mineral supply chains unless American companies can secure access to raw minerals to be refined. As these are dependent on the geographical location and accessibility of mineral deposits, America cannot simply mine all the raw minerals it needs domestically.

However, the federal government can build the framework necessary for American companies to secure foreign minerals. The Democratic Republic of the Congo controls more than half of the world's cobalt reserves, Brazil and Indonesia combine to produce 52 percent of nickel, and Brazil and Vietnam control most of the non-Chinese REE reserves. Accordingly, building diplomatic and business relationships with the Global South is essential to maintain access to those reserves.³³ Currently the Chinese control much of the mining enterprises in those countries, so America must work to win away support from China through investment as well as clear and limited security partnerships that advance clear American national interests.

In order to facilitate this investment, Washington

should cut regulations which currently inhibit American companies from foreign investment or make them uncompetitive. The Foreign Corrupt Practices Act of 1977, for example, forbids American companies to pay bribes to foreign leaders, even in countries where such practices are common or even expected. China, however, has no such scruples. Increasing engagement with the Global South combined with decreased regulation of overseas business practices are essential to gain a competitive edge over China to ensure American access to raw minerals.

Through these policies, America can solidify its short and long-term defense-critical mineral security. By ensuring the defense sector has access to the minerals it needs to sustain challenges, America can strengthen its ability to deter conflict, and ensure that American security is protected in the inevitable great power conflict with China. At the same time, by gaining critical mineral independence in the defense sphere, America can avoid unnecessary foreign entanglements while continuing to lead in the energy transition. America must take action on critical minerals to ensure its security into the future.

Endnotes

- 1 The Energy Act of 2020 defines critical minerals as “Any non-fuel mineral, element, substance, or material that the Secretary of Energy determines: (i) has a high risk of supply chain disruption; and (ii) serves an essential function in one or more energy technologies, including technologies that produce, transmit, store, and conserve energy.”
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