Working Paper

Limiting Adversarial Capital in Critical Minerals Supply Chains

Ashley Zumwalt-Forbes
Nonresident Fellow, Center for Energy Studies

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Abstract

The West cannot finance a critical minerals supply chain it cannot price, and it cannot price one until it can separate two kinds of supply: material controlled by adversarial capital, versus everything else. That separation is the precondition for a separate reference price, the subject of the next paper, and for the ~$19 billion in U.S. federal commitments (including the National Defense Stockpile, the Industrial Base Fund, the Office of Strategic Capital, and Project Vault) as well as allied funding (including the EU's Critical Raw Materials Act facilities and the ~€64 billion in projects the G7 welcomed at Évian).

A true separation cannot be made until allies can agree on what adversarial control means; this paper argues that control measures should not rely on a static ownership percentage in a vacuum, but should weigh the full range of control surfaces defined in Exhibit 2, and should be kept current as structures evolve.

Importantly, a definition Washington writes by itself is one allies will not adopt. The point of an allied definition is to build a separate market that uses non-China reference prices to make allied capacity bankable, which works only if allied buyers, lenders, and customs authorities recognize the same qualified producers and adopt the same standards.

This paper also proposes starting with a minimum viable product in a single market, tantalum, which already uses audit and traceability standards, establish an early win to prove effectiveness, then roll out to a total of 20 critical minerals on a set timeline.

What To Do

1. **Launch a minimum viable product.** Build and test the machinery on tantalum first, for an early win, rather than launching on all 60 critical minerals or the hardest one first. This enables time for allies to buy in, capital providers to understand bankability of the future timeline, and operators to test the system prior to full roll out.
2. **Define control, not ownership.** Establish an allied functional test for adversarial control, stand up a single ally-recognized qualified-producer list (adapting tantalum's existing conformant-smelter audit and traceability standards), make beneficial-ownership disclosure the price of admission, and enforce with mass-balance accounting and customs so material cannot be re-badged. Leverage existing technology and traceability systems to keep costs manageable.

3. **Roll out on a schedule.** Extend to the other in-scope materials (20 of the currently defined 60 USGS critical minerals, not all) on a published, time-gated sequence so capital can plan and underwrite new capacity in advance of the bifurcation timeline (Exhibit 4).
4. **Lodge it at the allied level.** House the system in a joint body so it survives any one government's four-year cycle.

No single current test can, on its own, carry the bifurcated pricing system I recommend in the following paper. This is the third paper in the Critical Minerals Capital Series.

Introduction

In a major conflict, the United States and its allies need critical minerals to continue flowing to the defense industrial base and major industries.

The stakes are not abstract. In a major conflict, the United States and its allies need critical minerals to keep flowing to the defense industrial base and major industries. At present, that capability and level of assurance do not exist. A company an adversary state controls is one whose supply that adversary can reroute at the worst possible moment. Preventing that outcome starts with understanding which sources of supply the U.S. and its allies control and which remain vulnerable.

The G7's June 2026 Critical Minerals Declaration

What happened: At the Évian summit on June 17, 2026, G7 leaders issued a joint declaration on securing critical minerals supply chains and stood up a permanent Critical Minerals Resilience and Production Alliance, with a coordination platform led by the International Energy Agency (IEA) to share supply-chain intelligence, run vulnerability assessments with the IEA and OECD, pilot stockpiles starting with lithium and nickel, and conduct emergency stress-test exercises. The involved parties are the G7 (Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States) and the EU; the broader allied coalition runs through FORGE (successor to the Minerals Security Partnership, chaired by the Republic of Korea), which adds Australia, Estonia, Finland, India, Norway, and Sweden. The declaration agreed to adopt a standards-based toolkit to screen forced labor out of critical minerals extraction.

What is needed: The declaration builds the venue this paper calls for but does not establish the recommended foundation. The Alliance and Platform are exactly the standing allied body that should develop and hold a common definition for adversarial control as well as the single qualified-producer list.

Source: G7 Leaders' Declaration on Securing Supply Chains for Critical Minerals, Évian, June 17, 2026.

The United States and its allies are trying to finance a critical minerals supply chain that cannot yet attract private capital on a standalone basis head-to-head against Chinese-set index prices. The deeper problem is a market failure: national-security risk is real but unpriced. The China-anchored price and market dominance were developed from decades of government-subsidized industry buildout and can be manipulated by orders of magnitude on a political whim. The need for resilience is not something private capital can tangibly underwrite, even when it remains one of the most acute national security issues. The instrument the supply chain has converged on is a separate, higher

price for material that does not come from an adversary-controlled entity. This paper does not recommend a government subsidy or a price floor. The aim is to build the plumbing of a separate market that private financiers can underwrite against, and private buyers can purchase from, not to have the state set or backstop a set price for multiple markets. That two-tier price is the subject of the next paper.

However, this new market cannot exist until something simpler is built first: a reliable way to tell adversary-controlled supply from the rest. Achieving that objective requires classifying companies by control surfaces (Exhibit 2), rather than by ownership percentage alone. Control, throughout this paper, means the functional kind: the ability to direct or veto an asset's strategic decisions, output, technology, or access. Control can hide in debt, contracts, licenses, and coordinated small stakes, while the people exerting it adapt faster than any published rule (Exhibit 1). For the allied version of this test, a neutral label such as Entity of Concern (EOC) avoids leading with a U.S. statutory acronym while keeping the same control-based meaning, which makes the standard easier for partners to co-own. The U.S. statutory definitions behind this label, foreign entity of concern (FEOC) and its relatives, are laid out in the terminology box within "The Tests and What Each Was Built To See" below.

Two real cases show why ownership percentage on its own is the wrong measure. In May 2026, Australia's Treasurer ordered six foreign shareholders to sell more than 1.6 billion shares in Northern Minerals, an ASX-listed heavy rare earths developer, on national interest grounds (a combined stake of ~27% of the company's free float).[1] The shares sat with six separate entities on the register, and each holding was small on its own (6.48% and 5.48%, for example); however, the concern was that they appeared to act in concert toward a common purpose: slowing development of the Browns Range project, one of the few heavy rare earth deposits outside China.

Now, the opposite case: in 2008, the Aluminum Corporation of China (Chinalco), a Chinese state-owned company, bought ~12% of Rio Tinto plc (about 9% of the combined dual-listed group) through a Singaporean vehicle. Chinalco remains Rio's largest shareholder today, at ~10% ownership of the combined group.[2] Regulators approved the purchase in 2008 with conditions: capped ownership at 14.99% of the plc (about 11% of the group), no board seat, and no increase without further approval. When Chinalco tried to deepen the stake in 2009 with a US$19.5 billion deal that would have added two board seats, Australia's Foreign Investment Review Board (FIRB) opened an extended review and Rio's board walked away. What survived was a large passive holding with no board seat, no vetoes, and no operational say. The percentage is high, but the effective control is near zero, and that is why it has gone untouched for years. How long it can remain untested is a different question.

Both decisions were right given the facts of the markets at the time (the Chinalco investment may have been rejected today), and both break the bright-line tests the United States uses. The coordinated Northern Minerals stakes would likely clear every U.S. ownership threshold as they would likely not be viewed as a totality. The passive

Chinalco stake nearly trips the bright-line test on a screen tuned to ownership percentage alone.

Two common rebuttals to market bifurcation are that (1) stockpiling can fix this and (2) the need to bifurcate the supply chain is only temporary. This paper argues that stockpiles can meaningfully stand in for a non-EOC supply base, particularly not in the near term. The West currently has little capacity to turn raw stockpiled material into the high-purity chemical forms the supply chain requires, and stockpiling the finished chemicals themselves can cause shelf-life and re-qualification problems, so an inventory buys far less insurance than it would for markets like crude oil or grain. Once a non-EOC supply chain is built, the EOC distinction cannot go away. Non-EOC supply is more expensive on a head-to-head basis, certainly as it scales and perhaps for good, and that cost gap is exactly what an adversary can attack, so the distinction cannot lapse.

Start With Tantalum

In order to win support from allies and capital providers, the separation should be demonstrated via a minimum viable product, no different than nascent technology startups establishing a new product. A pilot market needs to meet a clear set of conditions: (1) the market is thin enough that a separate reference price can hold; (2) EOC supply is concentrated enough at a supply chain node (or multiple nodes) that classifying the supply matters; (3) a non-EOC base (even a small one) exists that can be qualified today. The first two tests pick the most strategic minerals, while the third allows us to show early wins, gain market adoption, build a timeline, and build non-EOC capacity in advance of bifurcation for those materials.

Tantalum is an excellent first market. The global market is small (~2,400 tpa),[3] there is non-EOC supply (the Democratic Republic of Congo, Rwanda, Brazil, and Australia are all producers), EOC concentration sits downstream in processing, powder, and capacitor manufacturing, but, whilst China has the largest market share in these segments, there is real non-EOC production as well.[3] Importantly, tantalum is on the defense procurement covered list that takes effect January 1, 2027, so the regulatory hook already exists.[4]

Most important of all, tantalum already has the machinery this paper calls for, built for a different purpose. Tantalum is one of the 3TG conflict minerals (tin, tantalum, tungsten, and gold) and therefore it already runs on a working mine-to-smelter traceability system and an independent third-party audit that publishes a conformant-smelter list and removes processors that fail.[5] That conformant-smelter list is a qualified-producer list in everything but name, with audit and removal already functioning. The minimum viable product is not a green-field build; the existing chain-of-custody and audit scheme would need only to ask one added question: not only is this material conflict free but is the producer free of adversarial control.

From January 1, 2027, U.S. defense programs may buy tantalum only from outside covered nations, a requirement set today by the DFARS sourcing rule. The proposed allied qualified-producer list is a practical way to prove a producer meets those requirements and to unlock the financing behind that demand. For a lender, the cash flow to be underwritten is the bankable demand the designation unlocks in the form of DFARS-compliant and stockpile-eligible material, which, in turn, accesses the non-EOC market price. Designation turns a policy preference into qualified demand a credit committee can underwrite. Interestingly, the China and non-China tantalum benchmarks track closely, with no durable ex-China premium,[6] meaning the non-EOC market price may not be significantly different than the EOC price in this instance, but it will be free from EOC manipulation risk.

From tantalum, roll out on a published, time-gated schedule, the way the U.S. defense sourcing bans were announced years before they took effect, so producers and buyers can plan capital allocation and qualification windows against fixed deadlines.[4] Publish the sequence and timeline now to allow capital to underwrite new non-EOC supply. Exhibit 4 sets out a suggested sequence. Predictability is what makes the market and the policy durable.

One more screen to flag here, but it really belongs in the pricing paper: favor materials that are a small share of the finished good's cost and are themselves high value. An iPhone holds tens of milligrams of tantalum, worth roughly one to three cents, and the rare earth magnets in an electric vehicle are a fraction of a percent of its cost (combustion-engine cars are affected even less, despite swings in permanent-magnet pricing).[7] Materials that are a large share of end-product cost, like copper, are the wrong place for a premium, and the next paper sets out that pass-through test in full.

What To Do From Here

The action plan has five major steps, with enforcement and durability detailed in the Enforcement and Built to Last sections that follow. Most of this can be done under existing authority; the main exceptions are funding the tracing layer and consolidating administration in one place between allies.

1. **Keep the blacklist and add a Qualified Producer List:** The statutory negative list (covered nations in statute, named entities maintained by Defense, Commerce, and Homeland Security, and the PFE thresholds in the tax code) sets the outer boundary and answers who is barred. Add a published Qualified Producer List that answers who qualifies, the question buyers, lenders, and customs actually need answered. The London Bullion Market Association's Good Delivery List is a strong working model: qualification tied to a real commercial benefit, independent audit, and removal that happens.[8]
2. **Define the test as functional control:** Qualify or disqualify a producer on conditions that must all hold: the party controls, or stands to control, the producer's strategic decisions, output, technology, or access, across the levers in

Exhibit 2; that control is exercised by, for, or under the direction of an adversary state, judged against that state's laws; and the asset sits at a chokepoint. The existing ownership thresholds (25% single-party, 40% aggregate, 15% debt) stay, but as triggers that send a case to review and as safe harbors for plainly non-adversarial capital, not as the final answer.[9]

3. **Fund the ownership and tracing data as infrastructure:** Lot-level chain of custody plus beneficial-ownership data is the base layer. Fund that layer the way critical infrastructure is funded, not out of compliance budgets.[10]
4. **Run it through one allied-recognized body:** Stand up a single clearinghouse that maintains the list, owned by that body rather than by Washington, with U.S. and allied agencies referencing it instead of writing their own, and with each member's own screen (CFIUS, Australia's FIRB, the EU regulation) feeding the list through mutual recognition, so a producer cleared in one allied jurisdiction is not re-screened in the next, built inside the FORGE framework.[11]
5. **Lower costs by repurposing what exists:** House the clearinghouse inside a relevant existing allied body rather than standing up a new institution, fund qualification through audit and listing fees on the LBMA Good Delivery model so industry pays for the benefit it receives, and reuse Customs and Border Protection's existing Exiger deployment for monitoring rather than building a parallel system. Two further low-cost levers belong in this same group: adopt the emerging ASTM International F49 traceability and origin-verification standards rather than writing new ones and pilot the private supply-chain-traceability tools now entering the market, without handing them the security judgment. Together with the graph tools and the conformant-smelter audit, these are one move: start cheaply by reusing rails that already exist.

The joint definition and list does not need a binding treaty in order to have impact: its force comes from the instruments that reference it, including procurement rules such as the Defense Federal Acquisition Regulation Supplement (DFARS), offtake contracts, and stockpile terms.

Which Materials the System Should Cover

The need for international coordination begins even further upstream than deciding who may be included in supply chains. Globally, there is not even agreement on what counts as critical: the United States lists 60 minerals, Japan 34, and India 30[12], each drawn for its own economy.[13]

Whether the right count is 60, 34, 30, or a different number altogether, not every critical mineral needs an EOC list, and drawing the perimeter too wide is its own failure. A material belongs inside only when an adversary weaponizes controls of a critical chokepoint, restricting the ability for private capital to be deployed; when the material is strategically important to defense, semiconductors, or energy; and when it is discrete and traceable enough that classification is feasible. Where those conditions do not hold,

a qualified-producer list spends effort that it likely cannot recover in market build out and other capital markets-oriented solutions should be deployed instead.

There is an unusually objective guide to where the perimeter line should sit: the materials China has chosen to weaponize. Beijing placed export controls on gallium, germanium, and graphite in 2023, antimony in 2024, tungsten, tellurium, bismuth, indium, and molybdenum in February 2025, and seven medium and heavy rare earths (samarium, gadolinium, terbium, dysprosium, lutetium, scandium, and yttrium) in April 2025.[14] That set is a perimeter China has drawn for the West, and it maps closely onto the materials defense and electronics planners worry about most. Adding the magnet rare earths neodymium and praseodymium, plus tantalum and magnesium, where processing or supply is similarly concentrated, the in-scope list is: specified rare earths (neodymium, praseodymium, samarium, gadolinium, terbium, dysprosium, lutetium, scandium, and yttrium), tungsten, antimony, gallium, germanium, graphite, tantalum, indium, bismuth, tellurium, molybdenum, and magnesium. That is 20 individual materials, not 60.

It may also be necessary to include specialty chemicals with little to no ex-EOC supply, such as high-purity manganese sulfate (HPMSM), certain pCAM materials, and certain CAM materials without necessarily qualifying the upstream materials. I leave that discussion out of this paper, but the same logic applies. A similar logic applies to copper smelting and refining capabilities due to China's weaponization of the TC/RC charge, but that issue and the recommended solution are addressed in a separate copper-specific note on LinkedIn.[15]

What stays outside the perimeter matters as much as what goes in: deep, diversified commodities with real allied supply and no single adversary chokepoint do not need a qualified-producer list, and forcing one on them works against both the defense industrial base and allied reshoring as well as increases prices for consumers.

Getting the perimeter wrong has painful consequences: draw it too wide, and compliance cost repels the additive capital that the system is meant to attract and blanket de-risking pushes legitimate material into gray channels; draw it too narrowly, and the adversary simply shifts to the adjacent unlisted material or to a substitute, the way pressure on tantalum would move demand toward niobium and ceramic capacitors. Control migrates, so the perimeter must be a living list, reviewed on a published schedule, not a number fixed once in statute like the Section 45X Advanced Manufacturing Production Credit. From a pricing perspective, a material may reach non-EOC pricing parity as its market diversifies and adversary control of the chokepoint becomes manageable; however, the EOC designation is likely to remain necessary to ensure against a return to a fully adversary-controlled supply chain.

On WTO exposure, the design is built to survive a challenge under the GATT Article XXI security exception. Exhibit 5 sets out the full argument.

The Tests and What Each Was Built To See

The United States has gone furthest in writing adversary control down as an explicit rule. The terminology box below lays out the major definitions in effect today and Exhibit 1 outlines each U.S. test, including the agency that administers it.[4]

Foreign entity of concern (FEOC): In plain terms, a company that an adversary government owns, controls, or can direct. The term comes from Section 40207 of the Bipartisan Infrastructure Law, codified at 42 U.S.C. § 18741(a)(5): an entity owned by, controlled by, or subject to the jurisdiction or direction of a covered nation (China, Russia, Iran, or North Korea), plus entities on certain federal lists.[16] The Department of Energy's May 2024 rule made it testable: a company is a FEOC if it is incorporated, headquartered, or doing the relevant work in a covered nation, or if a covered-nation government holds 25% or more of its board seats, voting rights, or equity, each measured on its own and traced through intermediate owners. A separate prong disqualifies licenses and contracts that hand over effective control unless the licensee keeps the key rights for itself.[16]

Prohibited foreign entity (PFE): A broader rule the One Big Beautiful Bill Act (OBBBA) stacked on top of FEOC for the surviving clean energy credits, at new Section 7701(a)(51) of the tax code, involving SFE and FIE, outlined below.

Specified foreign entity (SFE): Identified mostly by lists: Chinese military companies under Section 1260H, the Uyghur Forced Labor Prevention Act list, battery makers named in the FY2024 defense authorization, and entities controlled by covered nations.

Foreign-influenced entity (FIE): Defined by the power an SFE holds over a firm: the right to name a senior officer or director, 25% or more ownership by a single SFE, 40% or more held by SFEs together, 15% or more of debt held by SFEs, or payments under contracts or licenses that confer effective control.[17]

Material assistance cost ratio (MACR): A supply chain test that denies credits when too much of a product's direct cost traces back to PFEs. For critical minerals, the threshold is 0% through 2029, then rises from 25% in 2030 to 50% in 2033 and after. In the near term, that means the tests that bite for minerals are about entities and procurement, not cost.[17]

The disagreements across the lists are not purely academic. A supplier can be barred from a defense program by the geographic test at 10 U.S.C. § 4872 and DFARS 252.225-7052 while remaining a perfectly eligible counterparty under the tax code.[4] A company below every ownership threshold can become a specified foreign entity overnight by landing on a government list it cannot predict.

Allies screen too, but none of them define FEOC the way the United States does, and no two define it alike (Exhibit 3). The European Union has no single EOC test. Its foreign investment screening regulation sets only a floor and leaves the review to each member state, so the definition of adversarial capital differs across capitals.[18] However, the EU's Critical Raw Materials Act, its Net-Zero Industry Act, and a proposed Industrial Accelerator Act each targets the same single-country production monopolies by effect, without naming China.[18]

Australia screens under the Foreign Acquisitions and Takeovers Act. A foreign government investor, which includes sovereign wealth funds and state-owned enterprises, is defined as any entity in which a foreign government and its associates hold 20% or more, or governments of more than one country hold 40% in aggregate. For critical minerals deals, there is no dollar floor: any such investment is reviewable, and the government can "call in" deals for national-security review, which was the power behind the forced Northern Minerals divestitures.[19] Canada uses the Investment Canada Act, and, in October 2022, set a policy approving state-owned acquisitions in critical minerals only in exceptional cases. Days later, it ordered three Chinese investors to divest minority stakes in Canadian-listed lithium developers, Sinomine from Power Metals, Chengze Lithium from Lithium Chile, and Zangge Mining from Ultra Lithium, on national-security grounds.[20] Japan screens any foreign investor, not only foreign governments, that acquires 1% or more of a company in 34 designated critical and rare earth minerals under its foreign exchange law.[21] The United Kingdom's National Security and Investment Act requires investors to notify the government before completing deals in 17 sensitive sectors.[22]

The takeaway here is that a producer can qualify in one jurisdiction and fail in another on identical facts, which would not allow a joint allied market to form.

How the Current Definitions Fail

A bright-line test generally screens something observable: a percentage, a home country, a production site, or a name on a negative list. This approach hands adversaries a published blueprint that capital can be engineered to satisfy. When the U.S. FEOC definition was finalized, CATL's founder and vice chairman reshuffled their holdings to bring a combined 27.9% stake under the 25% line in order to attempt to secure compliance.[23] A rule that can be satisfied by simply manipulating paperwork will be satisfied by manipulating paperwork, which is far cheaper than building compliant supply.

In general, the misses take recurring forms, and each has a public example.

- **Concert:** Several holders, each below the trigger, acting together, the Northern Minerals pattern.[1]
- **Contract:** An offtake or processing arrangement that hands a counterparty real control while ownership stays clean. When the Department of Defense took its stake in MP Materials in July 2025, the binding condition was that MP stop selling to China, including to Shenghe, which had been processing its concentrate, while Shenghe's small equity stake was allowed to remain.[24] The control lived in the offtake, not the equity.
- **Debt:** A position the PFE rules half-acknowledge by treating a 15% aggregate debt stake as control relevant.[17]

- **Licensing:** Under Notice 2026-15 the same Ford-CATL battery license can be FEOC or not depending on its date and wording, which ultimately means the test is measuring the contract, not the control.[25]
- **Geography:** A producer controlled by an adversary but operating one border away passes a test that asks only where material was made.[4]
- **Churn (a name moving on and off the lists):** The lidar maker Hesai was delisted, relisted, and back in court within fifteen months, so the OBBBA wired that instability into the tax code by tying credit eligibility to annual list decisions.[26]

Regulators have shown that they can act on control whenever the stakes are high enough to force it. The Committee on Foreign Investment in the United States (CFIUS) unwound Chinese ownership of Grindr and forced Beijing Shiji out of StayNTouch on data-access grounds, as well as blocked Broadcom's bid for Qualcomm even though Broadcom was based in Singapore, proof that nationality is not the trigger.[27] Australia blocked Ausgrid and APA and rejected the Kidman sale over a cattle station inside a weapons range.[28] These screens show the control test can be applied when the stakes demand it.

What Can Be Learned From Existing Certification Systems

Tantalum's conflict-minerals system is the closest working analog to what this paper proposes, and its design and its failures are both instructive. Several features are worth copying. It audits the chokepoint, not every mine: because there are far fewer smelters and refiners than mines, diligence concentrates on them, and the Responsible Minerals Assurance Process audits processors and publishes a conformant-smelter list.[29] An EOC qualified-producer list should sit at the same processing chokepoint. It runs on a standardized reporting form, the Conflict Minerals Reporting Template, a single free template that carries country of origin and processor identity up the chain so every downstream buyer reports the same way.[29]

An EOC system needs the same: one standard, machine-readable declaration that cascades. Ghana is the live version on the supply side: its new gold board has made itself the sole aggregator and is building mine-to-market traceability precisely to reach the responsible-sourcing markets that pay more, a producer state assembling the chain of custody this paper would require.[30] A standards body for exactly this already exists: ASTM International Committee F49, Digital Information in the Supply Chain, formed in 2022, is developing traceability, authentication, and origin-verification standards that explicitly cover critical minerals and battery materials, so customs and buyers can rely on third-party tracing of provenance and supplier identity. The qualified-producer list should adopt that framework rather than build its own, which also aligns with the G7's push for standards-based critical-minerals markets.[31]

The system failures are also instructive. Tracking can be laundered. In 2022, Global Witness documented untracked material entering the tagged channel at the bag-and-tag and trader level, with ~80% of tagged tin, tantalum, and tungsten in two areas of the

eastern Democratic Republic of the Congo coming from illicit sources in a single quarter, alongside a systematic failure of incident reporting.[32] Tags and self-certification can be defeated wherever unverified material enters the system, which is why the enforcement layer here leans on mass-balance reconciliation at the chokepoint, independent verification beyond the scheme's own paperwork, and audited incident reporting rather than documents alone. A traceability scheme is only as good as the controls on what gets into it.

The second failure is also consequential: Section 1502 of Dodd-Frank was only a disclosure rule, yet over-restrictive industry interpretation produced a de facto embargo of eastern Congolese tin, tantalum, and tungsten. This meant regional tin exports fell by ~90%, hundreds of thousands of artisanal miners lost income, and smuggling and instability rose in the vacuum.[33] The lesson for an EOC system is that a blunt posture of avoiding anything that looks risky pushes legitimate non-EOC material into gray channels and punishes the small producers.

The same lesson recurs within the Kimberley Process for diamonds which runs on government self-certification, requires no independent audit and no real penalty, and has been manipulated such that laundered stones move under compliant paperwork.[34] The London Bullion Market Association's gold list does the opposite, tying a real commercial benefit to independent audit and credible removal, and it holds.[16] Between them sits the rule for an EOC list: audit independently and remove credibly, or end up as the Kimberley Process. The next paper develops these as pricing precedents.

The Hardest Case: Who Is Behind the Shell

Each of the methods above assumes that company ownership can be identified and never changes. Neither is safe to assume. An adversary that wants a position in a strategic asset will not show up as itself. It shows up as a chain of private holding companies across friendly jurisdictions, with a nominee director somewhere in the middle and a passive-looking stake just under the review trigger, split across several vehicles so no single one trips a threshold. The Northern Minerals register was exactly this: small blocks, separate entities, a shared direction that only surfaced on investigation.[1] This is where ownership-based screening is weakest.

This is where AI could help, and the model already exists. A handful of firms (Sayari, Altana, Kharon, and Exiger among them) use graph analytics, which maps companies and the links between them as a network, to connect hundreds of millions of entities across 250-plus jurisdictions from corporate registry, trade, and litigation records. They trace ownership and control through layered structures and flag the tell-tale patterns of hidden control.[35] This is already in government use, with U.S. Customs and Border Protection running Exiger's system to detect illicit transshipment.[35] The designation system should adapt these tools rather than build its own from scratch. Given that this tracing layer pulls beneficial-ownership data across many jurisdictions, it must run on a clear lawful basis and on data minimization, so it aligns with allied privacy regulations

such as the General Data Protection Regulation (GDPR). These entity-resolution tools answer who controls a producer; a complementary, largely public resource answers where Chinese capital already sits. Rhodium Group's China Cross-Border Monitor is a comprehensive transaction-based accounting of Chinese outbound investment, tracking more than 500,000 individual deals and roughly $124 billion of newly announced Chinese FDI in 2025, which is the map needed to identify the assets and chokepoints that should be de-risked into allied ownership.[36]

Note that disclosure and graph tools surface hidden control, but the mass-balance reconciliation set out in the Enforcement section below is what stops a producer that still slips through from passing off more qualified material than it could have made.

Make it a requirement that, to get on the qualified-producer list, a company should disclose its full beneficial ownership and control relationships to the auditor and consent to ongoing monitoring. Although the world's shell companies cannot be forced into the open, disclosure can be made the price of admission to premium market, with graph-based tools used to test reported ownership and monitor changes over time. The analysis has to re-run continuously, not once at admission, or a clean producer that quietly changes hands stays on the list. This matters more now that China penalizes the audits themselves: under its June 2026 export-enforcement rules, accepting a foreign government's on-site verification without Chinese authorization is reportable conduct, so producers under Chinese control cannot be reliably audited, which is a further reason to build the list on independently auditable non-EOC producers rather than trying to certify the rest.[37]

Enforcement

A premium creates an incentive to cheat: buy cheap EOC material, relabel it as qualified, and pocket the difference. The layered set of controls this paper outlines keeps it out. Concretely, each period a qualified smelter's audited output is reconciled against its metered feedstock and nameplate capacity and lots are quarantined and assayed whenever the balance exceeds a defined tolerance of a few percent; the ITSCI failure came from tags applied without that reconciliation.

Traceability cannot stop at the processing node. It has to follow qualified material down the chain into intermediate and finished goods, because, if it does not, the arbitrage simply migrates downstream: a finished product built with cheap EOC material undercuts one built with qualified non-EOC material, and fabrication relocates to wherever the premium can be avoided, the way energy-intensive industry has shifted within Europe. The designation system's task is to make provenance legible at every stage, so the spread cannot be captured by moving one step offshore.

The deterrent is removal. A producer caught re-badging material is taken off the list, and, with that removal, loses access to the premium price and sensitive procurement processes.[26] Removal runs on bounded due process: a short, published cure period for

a curable lapse, a written record, and a right of appeal to the allied body, so a producer removed in error has a fast and predictable path back. Importantly, a bounded appeals process reduces the risk that an accidental removal scares off capital, and therefore strengthens the ability to underwrite against the market distinction.

To make this concrete, consider one illustrative example: a tantalum processor applies to the qualified-producer list and discloses its full ownership and control to the auditor. The graph tools cross-check the filing and surface what the paperwork hid: a 9% stake and a board seat held through two holding companies that trace back to an adversary-state entity, each piece sitting just under an ownership trigger. The producer is denied or, alternatively, admitted only once the controlling relationship is unwound. A year later, monitoring flags a new offtake that hands the same buyer marketing control; qualification is suspended pending re-audit, the producer is removed, and it uses the published cure period and appeal to show the offtake has been cancelled and earn its place back.

Built To Last

A system one election can undo will never attract capital at the scale required, so it should live at the allied level: a qualified-producer list owned by a standing joint body whose members honor one another's determinations, so no single government can revoke it alone. The venue already exists: the G7's June 2026 Évian declaration created the Critical Minerals Resilience and Production Alliance, paired with an IEA-led coordination platform, and the standing coalition is FORGE.[11] This need not be a new treaty body: a FORGE working group under existing authorities answers the sovereignty objection, since no legislature cedes power.

This is also where the current negotiation is weakest. France has pushed for a permanent secretariat to carry the critical minerals agenda across rotating presidencies, while Washington has preferred fast bilateral deals it controls.[11] Speed is necessary, but so too are a definition, a comprehensive list, and governance housed in an institution with a budget and a staff — factors that help reduce the four-year problem. Leverage existing systems and technology to increase speed and decrease costs.

Conclusion

The thread through this series is that the financing gap in critical minerals is a problem of market structure and unit economics, not a shortage of capital. Designation is the security-side version. The capital, the demand, the geology, and the political will are all present. What is missing is a reliable way to tell additive capital from adversarial capital, and the usual method, reading the share register, measures the wrong thing. Build the qualified-producer list first, in one market, with the identification and removal machinery attached, and the pricing paper has something solid to pay against. The first move is small and available now: stand up a FORGE working group that adopts the functional-control test and qualifies one audited material, tantalum.

Author’s Note

I served in the U.S. government, but this paper relies entirely on public information. Nothing here draws on non-public or deliberative material from my time in government.

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Exhibit 1. The US Designation Stack: Nine Federal Screens and What Each One Measures

The "what it measures" column is the thing each test looks at, which is not always the thing the policy is trying to catch.

Federal Screen	Legal Basis	What It Measures	Core Test	Documented Failure Mode	Agency
FEOC (Clean Energy Tax and Grants)	BIL § 40207; 42 U.S.C. § 18741; DOE interpretive rule (May 2024)	Ownership; jurisdiction; certain contracts	25% government equity, voting rights, or board seats, each tested independently; activity performed in a covered nation; effective control via license or contract	Threshold engineering (CATL restructuring below 25%); contract carve-out invites licensing workarounds	Treasury/IRS; Energy
PFE: Specified Foreign Entity	26 U.S.C. § 7701(a)(51)(B) (OBBBA, 2025)	Named lists; majority covered-nation ownership	1260H, UFLPA, and NDAA § 154 lists; foreign-controlled entities of covered nations	Inherits list churn (Hesai); renaming and unlisted intermediaries	Treasury/IRS
PFE: Foreign-Influenced Entity	26 U.S.C. § 7701(a)(51)(D)	Ownership; debt; officers; payments	25% single SFE; 40% aggregate SFEs; 15% aggregate SFE debt; officer or board appointment; payments under effective-control contracts	Rule-bound and threshold-based, therefore engineerable	Treasury/IRS
Material Assistance Cost Ratio	26 U.S.C. § 7701(a)(52); IRS Notice 2026-15	Supply chain cost shares	Credit denied below the ratio; critical minerals threshold 0% through 2029, rising to 50% by 2033	Verification assigned to taxpayers; supplier certifications under a reason-to-know standard	Treasury/IRS
Covered Materials (Defense Procurement)	10 U.S.C. § 4872; DFARS 252.225-7052 (effective January 1, 2027); FY2026 NDAA	Geography of production steps	No covered-nation step from mine to magnet for restricted materials	Tests where, not who; control travels while the production step relocates	Defense
Section 1260H Chinese Military Companies	FY2021 NDAA § 1260H	Named entities	Annual Department of Defense designation	Churn and litigation (Hesai removed, then re-designated); now imported into tax law via SFE status	Defense
UFLPA Entity List	Pub. L. No. 117-78	Named entities; rebuttable presumption	Listing plus presumption against goods linked to Xinjiang	Multi-tier commingling defeats tracing	Homeland Security (CBP)
Entity List Plus Affiliates Rule	Export Administration Regulations; BIS interim final rule (Sept 2025)	Named entities; 50% ownership	License requirements extended to majority-owned affiliates of listed parties	Suspended November 2025 to November 2026 as a trade-truce concession; designation as bargaining chip	Commerce (BIS)
OFAC 50 Percent Rule	OFAC guidance (March 2026)	Aggregate blocked ownership	Entities 50% or more owned by blocked persons are blocked; now "a floor, not a ceiling"	49.99% divestments; engineered ownership chains	Treasury (OFAC)

Sources: Statutes, Federal Register rules, IRS guidance, and agency actions cited in the Notes; author analysis.

Exhibit 2. The Control Surface: Vectors of Influence Beyond the Cap Table

Author analysis; cases cited in the Notes. The list is illustrative, not exhaustive.

Control Vector	How Control Operates	Illustrative Mechanism or Case
Equity and Equity-Linked	Veto and reserved-matter rights, golden shares, dual-class voting, convertibles, and warrants concentrate control above the economic stake.	Residual passive Rio Tinto stake is benign precisely because these rights are absent.
Debt	Security over the asset(s), restrictive covenants, and step-in and conversion rights turn a creditor into a controlling party.	PFE rules treat a 15% aggregate debt position as control-relevant.
Board and Governance	Seats, observer and nomination rights, and consent or deadlock provisions are control in its most direct form.	The 2009 Chinalco deepening, abandoned under FIRB scrutiny, would have added two board seats.
Offtake and Marketing	Take-or-pay, exclusive distribution, and marketing-agency rights determine who may buy the product, at zero equity.	MP Materials severed China offtake and processing while residual equity remained.
Technology and IP Licensing	Control of separation or processing technology; the asset cannot make salable product without the license.	FEOC and PFE licensing prongs; Ford-CATL structure tested by drafting rather than substance.
Supply and Equipment Dependence	Single-source reagents, feedstock, and EPC contracts, and embedded or remotely serviced equipment.	Input-side chokehold over operations.
Financing Structures	Streaming, prepayment, and royalty deals entangle a project economically without appearing as equity.	Examined in Paper No. 2 of this series.
Operating and Services	Operator-of-record status and secondment of technical staff place day-to-day control with a counterparty.	Control independent of share ownership.
Customer Concentration	A single dominant buyer can dictate terms and coerce by threatening withdrawal.	Buyer power as a control position.
Data and Physical Access	Access to sensitive data or proximity to sensitive sites confers a hold over operations and personnel.	CFIUS logic in Grindr and StayNTouch; Kidman and the Woomera range.

Sources: Agency actions and filings cited in the Notes; author analysis.

Exhibit 3. How Six Jurisdictions Define Adversarial Capital

Author analysis of the statutes, regulations, and agency policies cited in the Notes. No two jurisdictions define the qualifying entity the same way, and none was designed to carry a market-wide qualified-producer list. A producer can pass in one column and fail in another on identical facts.

Jurisdiction	Main Instrument	Trigger or Threshold	What It Measures	Built For
United States	FEOC and PFE rules; Section 1260H and related lists	25% single or 40% aggregate ownership; 15% debt; list membership	Ownership, jurisdiction, contract rights, names	Tax credits and defense procurement
European Union	FDI Screening Regulation; Critical Raw Materials Act; Net-Zero Industry Act	Member-state discretion; 65% single-country consumption benchmark	Concentration and case-by-case national-security risk	Investment review and supply diversification
Australia	Foreign Acquisitions and Takeovers Act (FIRB)	Foreign government investor at 20% single or 40% aggregate: nil threshold for critical minerals	State ownership and national interest	Case-by-case investment review
Canada	Investment Canada Act; 2022 SOE critical minerals policy	State-owned control approved only in exceptional cases	State control through acquisitions	National Security investment review
Japan	Foreign Exchange and Foreign Trade Act (FEFTA)	1% acquisition in 34 designated minerals and magnets	Ownership in core sectors	Supply security and technology-leak prevention
United Kingdom	National Security and Investment Act 2021	Mandatory notice across 17 sensitive sectors	Control acquisitions in sensitive sectors	National-security review

Sources: Statutes, regulations, and agency policies cited in the Notes; author analysis.

Exhibit 4. A Suggested Rollout Sequence

Author proposal. Each cohort activates on a single published date, set now so producers and buyers can build against it. The trigger is the date and dates are illustrative.

Effective Date	Materials	Where Non-EOC Supply Stands Today
2027	Tantalum	3TG conformant-smelter rails (ITSCI, RMI/RMAP, CMRT) already identify non-EOC supply; the U.S. defense covered-material bar takes effect January 1, 2027.
2028	Antimony, tungsten	Both already under Chinese export control; non-EOC mine supply exists (Australia, Bolivia, Tajikistan, Portugal, Vietnam) and Western processing is scaling.
2029	Gallium, germanium, graphite, magnesium	China dominates processing; Western refining and recycling are in build-out, so the date allows time for that capacity to qualify.
2029	Indium, bismuth, tellurium, molybdenum	Byproduct metals with ex-China primary supply but concentrated refining; activated alongside the 2029 cohort.
2030	Neodymium, praseodymium	Magnet-grade separation and magnet capacity are scaling (MP Materials, Lynas, e-VAC); the date gives magnet makers runway.
2031	Dysprosium, terbium, samarium, gadolinium, lutetium, scandium, yttrium	Medium and heavy rare earth separation outside China is minimal today; the longest runway, so this cohort comes last.

Source: Author analysis.

Exhibit 5. Why the Design Survives a WTO Challenge

The version most open to challenge is a unilateral U.S. measure that looks like origin-based protection, but the design here is built to survive. Each design choice below moves the measure from the weakest WTO ground toward the strongest.

Design Choice	Why It Strengthens the WTO Defense
Legal Basis	Rests on the GATT Article XXI security exception, which covers action a member considers necessary to protect essential security interests in an international emergency. A defense supply chain an adversary can cut is exactly that.
Origin-Neutral	Screens on functional control by an adversary state, not on nationality, so a producer in any country can qualify by passing it.
Narrow and Security-Tied	Limited to the 20 materials and tied to security rather than general economic advantage.
Allied Co-Ownership	Co-owned with allied regimes (the EU Critical Raw Materials Act among them) that point the same way, so it reads as collective security rather than unilateral industrial policy.
Procurement Carve-Out	The sharpest edges, defense procurement bars like the DFARS covered-material rule, already sit inside procurement, where security carve-outs are clearest.
No Subsidy	Designation sets eligibility, not payment, so any subsidy or countervailing question belongs to the price in the next paper, not to the list.
Precedent	WTO panels have treated Article XXI as justiciable but highly deferential (Russia, Measures Concerning Traffic in Transit, 2019), and export-controlled defense inputs are among the strongest cases under it.

Source: Author analysis.