



Working Paper

Technical Disclosure as a Gating Item in Critical Minerals Finance

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Abstract

Western governments continue to identify critical minerals as strategically important, but strategic importance is not the same thing as financeability. Markets still decide which projects get financed and, in practice, that determines which projects get built.

Many minerals projects, both critical minerals and broader commodities, do not stall because the deposit is uninteresting or because the long-term commodity thesis is inaccurate. They stall because the project does not become credible enough, legible enough, and sufficiently de-risked for boards, investors, lenders, strategic partners, and exchanges to engage in a serious way. The skill set required to discover and de-risk an early-stage deposit rarely translates to the skill set required to build and scale a project.

That is why technical and resource disclosure should be understood not just as a compliance requirement, but as part of the financing pathway itself. U.S. Securities and Exchange Commission (SEC) Subpart 1300 (S-K 1300), JORC, and NI 43-101 are disclosure regimes in form.¹ In practice, they also function as capital filters. The SEC's 2018 mining modernization rule, which created Subpart 1300 of Regulation S-K, was intended to give investors a more comprehensive understanding of mining properties and help them make more informed investment decisions. JORC and NI 43-101 are likewise grounded in transparency, materiality, and competence. The issue is not that these frameworks are misguided. The issue is that the work required to satisfy them is expensive, time-consuming, and often becomes the gating item for financing, particularly in critical minerals where process risk, product qualification, and market volatility add another layer of complexity.²

In effect, the mining exploration model has broken down. Exploration is largely being pushed onto undercapitalized junior mining companies that can take the work to a point but generally hit a wall when it is time to raise and deploy real capital to meet technical disclosure requirements and attract larger financing partners. In more established markets such as copper or gold, a junior can often advance a project far enough to attract a strategic stake, earn-in, joint venture, or outright acquisition by a larger mining company. That ecosystem is much weaker in many critical minerals markets. Outside China, there are often very few scaled players with the balance sheet, operating capability, and processing experience to take projects from technical promise to development. In some niche critical minerals, the market is so limited that there may not be a natural pool of logical consolidators at all.

The practical implication is straightforward: If policymakers, governments, and investors want more critical minerals projects financed, they need to focus less on strategy in the abstract and more on access to capital for projects at the point where geology is converted into financeable risk through a credible technical disclosure process.

Introduction

There is no shortage of public commentary on critical minerals. Most of it is directionally right and still incomplete. Yes, these commodities matter for energy systems, industrial capacity, defense capabilities, and supply-chain resilience. Yes, the West needs more reliable supply. Yes, capital is part of the problem, and, in my view, it is the largest part of the problem. What gets less attention is where projects fail between early promise and a real financing decision.

The failure point is often not the commodity thesis or even permitting, but rather the project package as a whole. A mineral occurrence must be translated into something the market can diligence and underwrite, which is much more than a resource and a narrative. The market requires metallurgy that is digestible, infrastructure assumptions that survive scrutiny, cost estimates with real credibility, a development path that makes sense, and technical disclosure prepared by the right people under the right scope. In other words, the project must become financeable in a form the market can evaluate.

This logic is why this working paper treats technical disclosure as an economic issue rather than a narrow compliance issue. A technical report, technical report summary, pre-feasibility study, or feasibility study should not be treated as just a filing requirement or an investor-relations document. These documents are the package through which geology, mining method, processing plan, capital cost, operating assumptions, and economics are turned into something external capital can evaluate and ultimately underwrite.

These project packages matter even more in critical minerals because the sector is unusually exposed to process risk and market volatility. The International Energy Agency (IEA) reported that lithium prices fell by 75% in 2023, while nickel, cobalt, manganese, and graphite prices fell by roughly 30% to 45%. At the same time, investment growth slowed materially from the prior year. In a forgiving market, a partial or ineffective study can sometimes survive on narrative. In a tighter market, it usually cannot.³

Disclosure Regimes in Practice

S-K 1300, the JORC Code, and NI 43-101 are designed to improve the quality and comparability of public technical information, which is the right goal to protect investors. To be clear, this working paper is not an argument for weaker standards.

However, because these frameworks are the mechanism through which a mineral occurrence is translated into something capital can evaluate, a compliant technical document is often the first point at which a board, lender, strategic investor, export credit agency, or exchange can decide whether a project is sufficiently real to engage with.

This is especially clear under the U.S. Securities and Exchange Commission (SEC) framework. S-K 1300 ties mineral reserve disclosure to a qualified person's pre-feasibility study or feasibility study which must include the qualified person's detailed evaluation of all applicable modifying factors (mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, and social, among others) to demonstrate the economic viability of the property or project. That is securities-law language, but it maps closely to the way capital underwrites mining risk. The same set of factors a lender or strategic investor would diligence is, by rule, the same set the qualified person must sign off on. It is one reason the line between "disclosure ready" and "financeable" has become so narrow in practice.⁴

This does not mean compliance and financeability are identical. A project can satisfy a formal disclosure requirement and still fall short of what lenders, strategic investors, or public-market investors need to see, particularly in volatile or thinly traded markets. Inherently, not every project should be a winner. However, in real transactions, the same technical work product increasingly underpins both compliance and financeability. That is why technical disclosure has become part of the financing pathway rather than something adjacent to it.

Why Critical Minerals Are Harder To Finance

These financing and compliance constraints exist across commodities broadly, but they are more severe in critical minerals for four reasons.

First, many critical minerals projects carry a higher level of process and product risk than traditional commodity markets typically see. In copper or gold, markets have a long history of underwriting projects through relatively familiar frameworks. In many critical minerals, questions abound regarding whether the material can be processed consistently, whether impurities can be managed, whether the final product can meet customer specifications, and whether the economics still work once those realities are built into the model. Generally, higher risk requires higher returns in order to attract capital; as I and other practitioners have written extensively, critical minerals generally do not meet these higher return thresholds.

Second, many critical minerals also carry a more acute customer and revenue risk. In mature bulk commodities, there is often a clearer line of sight between production and sale. In many critical minerals, the underwriting problem is not just whether the ore can be mined and processed, but whether the resulting product can be qualified, sold, and priced in a way that supports a credible revenue model. Offtake risk and qualification

risk are therefore much more central to financeability than they are often in more traditional commodity projects.

Third, many of these markets are structurally very thin. In more established commodities, juniors can often rely on a natural next set of counterparties: a major producer, a mid-tier consolidator, or a credible strategic buyer. In many niche critical minerals, that handoff mechanism barely exists outside China. As a rough production-value proxy, using 2025 U.S. Geological Survey (USGS) world production data and observed market prices, gallium is a market measured in the hundreds of millions of dollars, antimony in the low single-digit billions, and yttrium between roughly \$100 million and well over a billion depending on where in 2025 you mark the price, after China's April 2025 export controls on heavy rare earths drove yttrium oxide prices up roughly 1,500% in a matter of months.. Many of these markets are simply too small to support a deep bench of natural consolidators, financiers, and technical operators.⁵

Fourth, price volatility makes the whole process less forgiving. The IEA's 2024 review shows that critical minerals prices weakened sharply in 2023 even as long-term demand expectations remained constructive. It means projects have to be technically credible earlier in order to attract the capital necessary to get through technical disclosure requirements.⁶

S&P Global's exploration data point in the same direction. Global nonferrous exploration budgets declined for a third consecutive year to \$12.40 billion in 2025, while junior budgets fell 13% to \$4.39 billion. Fundraising more than doubled year-over-year to \$21.43 billion as lower rates and stronger gold, copper, and silver prices loosened the financing environment, but most of that capital flowed to mine development rather than greenfield exploration. In other terms, capital is available, but only for projects that look increasingly real.⁷

Where Projects Stall

Projects fail because they cannot attract the right kind of capital at the right stage. That failure starts earlier than many people assume, when the technical package in front of the market is still too incomplete, too uncertain, or too poorly sequenced to support the next financing decision or the next disclosure report.

At that juncture, management often has enough to tell an attractive story. There may even be a resource, a market thesis, some early metallurgical work, and enough momentum to support a valuation discussion. In some cases, a sophisticated enough promoter may still be able to clear the next capital hurdle. However, outside of those fortunate few, what often remains unresolved and makes the project unfinanceable are recovery assumptions, process credibility at scale, infrastructure realism, capital intensity, schedule logic, and product sale assumptions.

This is also where it is useful to distinguish between capital pools. Exploration capital may tolerate a geological story. Strategic capital will usually want clearer line of sight to scale, product quality, and competitive position. Project finance and export credit financing require a much more mature package, including feasibility work, engineering definition, environmental and social diligence, and a credible revenue model. Concessional or public capital can help bridge gaps, but even that money tends to be conditioned on evidence that a project is moving toward investment readiness rather than away from it.

Here is where the financing trap emerges. A project needs more money to answer the next set of questions, but the next pool of capital is unwilling to fund that work until more of the risk has already been reduced. Junior companies are particularly exposed because they can often carry a project through early exploration and some initial de-risking, but not through the full sequence of work required to reach a serious financing decision. Critical minerals are even more exposed because they so often lack the larger players that would naturally step in as acquirer, joint venture partner, or strategic backer.

Public finance institutions are unusually clear on this point. Export-Import Bank of the United States' (EXIM) project finance guidance states that serious project financings generally require completed feasibility work, Front-End Engineering and Design (FEED) studies, an approved Environmental and Social Impact Assessment (ESIA), and a preliminary finance plan structure. European Investment Bank (EIB) Global's February 2026 technical assistance for Andrada and EcoGraf was aimed at moving projects from feasibility stage toward investment readiness. That matters here because it shows that even public institutions struggle without the same feasibility-stage and readiness-stage work that private capital also treats as a prerequisite. The bottleneck is not just enthusiasm for the sector, but rather whether the project has reached a level of technical maturity that can support serious underwriting.⁸

Consultant Selection Is a Capital Decision

At the heart of the niche world of mining technical disclosure reporting is an even more niche world: consultant and scope selection.

A technical report can be fully compliant and still fail to move money. Each of these regimes places personal professional accountability on a named qualified person ("qualified person" under S-K 1300 and NI 43-101, "competent person" under JORC) which is precisely why the choice of who signs the work is a capital-allocation decision, not a procurement one. That failure may come from insufficiently de-risked metallurgy, unrealistic infrastructure assumptions, a cost estimate that lacks credibility for the jurisdiction or commodity, a process flowsheet that has not been sufficiently tested, a weak market, or simply a scope that was not designed to answer the questions the next financing counterparty will ask.

This issue is more acute in critical minerals because generic mining experience is often not enough. A team that is well qualified to write on a conventional bulk commodity project may still be the wrong team for a project whose outcome depends on impurity management, downstream conversion, product qualification, or specialty processing. In those cases, consultant choice is not just about reputation or price, but about whether the work actually addresses the material risk in the asset. JORC's emphasis on competence, transparency, and materiality goes directly to this point.⁹

A compliant report is not automatically a financeable report. If the objective is to reach a financing decision, technical scope should be designed backward from the likely capital pathway and consultant selection should be viewed more as partner selection and core capital-allocation risk than as a procurement exercise.

What Should Be Done

For explorers, the first recommendation is simple: Treat technical disclosure as part of financing strategy from the beginning. Do not produce studies because they seem like the generic next step. Design them and produce them to answer the questions the next capital provider will ask.

For boards, scope design and consultant selection should be treated as core capital-allocation decisions. Cheap scope can become expensive scope if it fails to unlock the next financing event. It can leave a project completely stalled.

For investors, the financing gap in critical minerals should be understood less as a shortage of money in the abstract and more as a shortage of money willing to fund the specific work that makes projects financeable. That suggests more milestone-based funding tied to technical outputs such as metallurgy, pilot work, process validation, qualification, feasibility readiness, and, where applicable, customer qualification and offtake development. An earn-in joint venture model, similar to what major mining companies have long used in bulk commodities, is a more constructive template than broad thematic enthusiasm unsupported by technical milestones.

For policymakers, the most useful intervention is not to weaken standards or spread support broadly across every project labeled "critical." The most widely felt impact would come from improving the conversion rate from mineral endowment to financeable asset: feasibility-stage grants, pilot and demonstration support where process risk is high, technical assistance, and public support programs that force clarity around what the next financing decision actually requires.

There is also a sharper point worth stating: Not every critical mineral project should be financed. Better technical disclosure and better sequencing do not just help more productive projects get funded. They also help the market identify weaker projects earlier, before more money is lost. That helps curb what is at times becoming irrational exuberance.

Conclusion

The critical minerals debate often assumes that the main problem is a lack of policy support or a lack of capital. Those issues are real, but they do not fully explain the reasons behind many projects' inability to reach financing decisions.

The deeper problem is that too few projects are being advanced in a way that makes them financeable in the eyes of the market. Technical disclosure regimes did not create that reality, but they sit directly at the point where it becomes visible. They are part of the process by which a deposit becomes legible, credible, and capable of attracting serious capital.

That is why technical disclosure should not be treated as a narrow compliance exercise. It shapes the financing pathway from the beginning. The challenge in critical minerals is not simply to find more deposits or identify more strategic projects. The goal is to improve the conversion rate between mineral endowment and financeable assets in cases where the projects are real. That is a much more practical objective, and a much more useful one.

Notes

¹ "Modernization of Property Disclosures for Mining Registrants: A Small Entity Compliance Guide," US Securities and Exchange Commission, last updated December 4, 2018, <https://www.sec.gov/resources-small-businesses/small-business-compliance-guides/modernization-property-disclosures-mining-registrants-small-entity-compliance-guide>; "JORC Code," Australasian Joint Ore Reserves Committee (JORC), accessed May 7, 2026, <https://www.jorc.org/>; "43-101 Standards of Disclosure for Mineral Projects," BC Securities Commission, accessed May 7, 2026, <https://www.bcsc.bc.ca/securities-law/law-and-policy/instruments-and-policies/4-distribution-requirements/current/43-101>.

² U.S. Securities and Exchange Commission, Modernization of Property Disclosures for Mining Registrants, Release No. 33-10570, October 31, 2018, <https://www.sec.gov/files/rules/final/2018/33-10570.pdf>; U.S. Electronic Code of Federal Regulations, 17 CFR Part 229, Subpart 1300, "Disclosure by Registrants Engaged in Mining Operations," <https://www.ecfr.gov/current/title-17/chapter-II/part-229/subpart-229.1300>.

³ International Energy Agency, Global Critical Minerals Outlook 2024, market review and executive summary, <https://www.iea.org/reports/global-critical-minerals-outlook-2024/executive-summary>.

⁴ U.S. Securities and Exchange Commission, Modernization of Property Disclosures for Mining Registrants, Release No. 33-10570, October 31, 2018; U.S. Electronic Code of Federal Regulations, 17 CFR Part 229, Subpart 1300, "Disclosure by Registrants Engaged in Mining Operations," <https://www.ecfr.gov/current/title-17/chapter-II/part-229/subpart-229.1300>.

⁵ U.S. Geological Survey, Mineral Commodity Summaries 2026: Gallium, <https://pubs.usgs.gov/periodicals/mcs2026/mcs2026-gallium.pdf>; U.S. Geological Survey, Mineral Commodity Summaries 2026: Antimony, <https://pubs.usgs.gov/periodicals/mcs2026/mcs2026-antimony.pdf>; U.S. Geological Survey, Mineral Commodity Summaries 2026: Yttrium, <https://pubs.usgs.gov/periodicals/mcs2026/mcs2026-yttrium.pdf>.

⁶ International Energy Agency, Global Critical Minerals Outlook 2024, market review and executive summary, <https://www.iea.org/reports/global-critical-minerals-outlook-2024/executive-summary>.

⁷ S&P Global Market Intelligence, World Exploration Trends 2026, <https://www.spglobal.com/market-intelligence/en/news-insights/research/2026/03/world-exploration-trends-2026-what-the-latest-data-says-about-budgets-risk-appetite-and-the-project-pipeline>.

⁸ Export-Import Bank of the United States, “Guidelines for Submitting a Successful Structured & Project Finance Application,” <https://www.exim.gov/solutions/project-and-structured-finance/guidelines-for-submitting-successful-application>; European Investment Bank, “EIB Global backs sustainable critical raw material projects in Africa,” February 11, 2026, <https://www.eib.org/en/press/all/2026-050-eib-global-backs-sustainable-critical-raw-material-projects-in-africa>.

⁹ Joint Ore Reserves Committee, JORC Code, 2012 Edition, https://www.jorc.org/docs/JORC_code_2012.pdf.