In Rubidium, Hallgarten + Company Detects a Critical Mineral Poised to Upend a Quiet Monopoly

written by Tracy Hughes | July 30, 2025

A year ago, few outside the most arcane corners of materials science could spell **rubidium**, let alone explain why it matters. Yet in recent months the alkali metal—soft as cheese and pyrophoric enough to flare when exposed to air—has begun to surface in a growing trickle of exploration news releases. Quantum Critical Metals Corp. (TSXV: LEAP | OTCQB: ATOXF) in Quebec trumpeted assays running "701 g/t rubidium," while Nevada-focused Surge Battery Metals claimed "significant amounts" of Rb at its lithium project.What was once a footnote element is inching into capital-markets chatter, often with the breathless label "critical."

The timing is no accident. In a 18-page note released this week—*Rubidium: Cesium's Lesser-Known Twin*—Hallgarten + Company's Christopher Ecclestone and Sergei Shulin argue that rubidium's moment is less hype than hard-nosed opportunity. Their thesis is blunt: if rubidium can dislodge cesium in just one crucial niche—high-pressure, high-temperature (HPHT) oil-and-gas workovers—industry could pry open a market long monopolized by the Chinese-controlled Sinomine Resource Group, owner of the pollucite-rich Tanco mine in Manitoba and the world's sole commercial supplier of cesium formate brines.

A monopoly nobody notices—until it pinches

Cesium formate, a dense, non-toxic drilling fluid that stabilizes extreme-pressure wells, is indispensable to deep gas projects from the North Sea to the Gulf of Mexico. Sinomine's marketing literature is explicit: it is **"the only producer and supplier of cesium formate in the world."** Market researchers peg the cesium formate segment at roughly $150 million in annual sales and climbing with every push into deeper reservoirs.

Yet supply is brittle. Tanco's production has been interrupted by labour disputes and, this spring, by Manitoba wildfires that crept within kilometres of the underground operation.Zimbabwe's Bikita mine—a historic second source—now sits inside an export-ban regime that has already choked off lithium concentrate shipments and could be extended to other strategic minerals.Lose Tanco, Ecclestone warns, and the oil-service sector "could find itself with no fluid at any density above 1.8 g/cm³."

Rubidium formate, Hallgarten contends, offers a chemically near-identical alternative. "If Rb can elbow its way into contention," the analysts write, "Sinomine can be ousted from its dominant position." That single substitution, they calculate, would create a baseline demand of several hundred tonnes a year—orders of magnitude above today's vanishingly small one-to-two-tonne U.S. market.

How similar is "similar enough"?

On the periodic table, **rubidium (atomic number 37)** sits one square above **cesium (55)**. Both metals share the large ionic radius and single valence electron that confer high solubility

in formate chemistry. Both, inconveniently, ignite on contact with water. Where they diverge is cost and availability. Rubidium is roughly as abundant as zinc and “rather more common than copper,” according to USGS data, though rarely concentrated enough to mine directly.Cesium, by contrast, is 30 times scarcer and locked almost exclusively in pollucite lenses measured in tens of metres.

Rubidium’s curse has always been dispersion. It occurs as trace contaminant in lepidolite and other lithium micas—minerals already blitzed by the battery boom. Hallgarten sees that coincidence as a windfall. “Every shovel dug for lithium today is effectively a rubidium exploration program,” Shulin quips in the note. Lepidolite zones in China’s Yichun district assay up to 3.5 percent Rb_2O, while Quebec’s James Bay camps routinely return 0.5–1 percent. Processing circuits designed to leach lithium can recover rubidium at marginal cost, especially where caustic sintering routes already produce potassium-rich liquors.

The atomic-clock dividend

Rubidium’s other established market—low-cost atomic clocks—underscores the substitution theme. Commercial rubidium standards, ubiquitous in telecom base stations and GPS disciplined oscillators, sacrifice nanoseconds of accuracy for an order-of-magnitude price break versus cesium fountains. NIST notes that rubidium devices “are regarded as secondary representations of the second,” good to one part in 10^9 and small enough to fit on a circuit board. If telecom operators can live with that tolerance, Hallgarten argues, so can drillers whose metric is hydrostatic pressure rather than picoseconds.

Pricing the priceless

Skeptics will point out a glaring obstacle: there is no transparent rubidium price. “All attempts to elucidate the real cost of mining and the margins and profits (or losses) for rubidium and cesium are elusive,” Hallgarten concedes. The handful of specialty-chemical companies that buy the metal negotiate bespoke contracts measured in kilograms, not tonnes. But Ecclestone counters that the absence of a quoted market is precisely what allows monopolies to flourish. “Cesium brine sells for whatever Sinomine says it sells for,” he notes. Introduce a second supplier, even of a different but compatible fluid, and price discovery begins.

The Chinese angle

Rubidium’s strategic allure is amplified by geopolitics. **Beijing owns or influences every significant cesium source**: Tanco through Sinomine, and Bikita via Sinomine’s Beijing-backed acquisition in 2022. Domestic Chinese lepidolite mines feed the country’s sprawling lithium smelters, giving processors first dibs on any rubidium by-product. Hallgarten therefore flags *non-Chinese* lepidolite assets—Australia’s Pilgangoora, Brazil’s Grota do Cirilo, and Canada’s Case Lake—as potential recipients of Western government grants aimed at “friend-shoring” critical-mineral supply chains.

Such support is not fanciful. The U.S. Inflation Reduction Act already funnels billions toward lithium, rare earths and graphite projects in allied nations. Extend the logic to rubidium—as the Pentagon did with beryllium and gallium this year—and a junior miner with a credible Rb-rich lepidolite resource could tap the same funding pool. As Ecclestone puts it, **“Rubidium’s best credential may be that Washington hasn’t**

noticed it yet. That makes it politically cheap to champion.”

Early movers—and many pretenders

For investors, separating substance from slogan will be critical. Hallgarten singles out only two listed companies with compliant rubidium resources (both undisclosed in the public excerpt), and warns that “managements cheekily throwing ‘rubidium’ into a headline” often hold nothing more than trace assays. The firm’s due-diligence checklist reads like a mining-sector stress test: lepidolite tonnage above 10 Mt, Rb_2O grades exceeding 0.45 percent, lithium credits to cover operating costs, and downstream relationships with specialty-chemical buyers.

Still, the speculative froth is building. Venture exchanges are littered with micro-caps touting rubidium alongside gallium, tantalum or whatever the market fancies this quarter. Readers of Hallgarten’s note will find a sober antidote to that chatter—nearly twenty pages of chemistry, process flowsheets and, crucially, case-study economics that model Rb formate breakeven at densities competitive with cesium brine.

Why the report matters

Hallgarten + Company is no stranger to contrarian metal calls; Ecclestone was early on **antimony** and built a career identifying specialty niches before they became dinner-table acronyms. In *Rubidium: Cesium’s Lesser-Known Twin*, he and Shulin deliver the rare commodity brief that fuses academic metallurgy with trading-desk pragmatism. The document lays out:

- **Supply map**—pegmatite districts ranked by Rb potential, with colour-coded flags indicating Chinese influence.

- **Process routes**—side-by-side cost curves for acid-sulfate leach, gypsum roast and ion-exchange chromatography, each annotated with real-world operating data from legacy lithium plants.
- **End-use adoption curve**—a three-stage market-entry scenario that begins with 5 percent displacement of cesium formate and scales to specialty-glass, catalyst and medical-imaging segments.
- **Risk matrix**—from rubidium's "tendency to explode upon contact with oxygen" to opaque transport regulations that treat it more like high explosives than minor metal.

For engineers, the review is a crash course in an element most textbooks relegate to footnotes. For investors, it is a filter that sifts meaningful rubidium plays from headline glitter. And for policymakers fretting over single-point failures in strategic supply chains, it is a reminder that vulnerability often hides in plain sight.

A call to read—before the crowd does

Commodity narratives move fast: yesterday, cesium was a chemistry-set curiosity; today, one Chinese company can veto a swath of HPHT drilling projects. Hallgarten's rubidium primer arrives just as Western governments scour the periodic table for overlooked leverage points. Whether rubidium truly dethrones cesium—or merely pressures its pricing power—will hinge on technical proofs still to come. But the groundwork is here, in lucid prose and data-rich exhibits.

Serious readers of critical-minerals research would be remiss to skip it. At the very least, *Rubidium: Cesium's Lesser-Known Twin* equips decision-makers to ask smarter questions the next time a junior miner flashes "Rb" in a headline. At best, it may signal

the birth of a new, if niche, strategic metal market—one whose supply chain has yet to calcify under a monopoly. In specialty metals, that alone is worth a long, careful read. To access the full report, click here

Critical Minerals Institute (CMI) Note: Rubidium is currently listed as a critical mineral by the USA USGS, New Zealand Critical Minerals List, and the Japan Critical Minerals List. To access the CMI Library, and these lists – click here