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Testimony

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Addressing the Critical Mineral Crisis:
An American "All of the Above" Strategy for the Tech Metals Age

Ranking Member Westerman, Members of the Committee, thank you for the opportunity to take part in this Forum with my fellow witnesses today.

One of the advantages of virtual sessions is the ability to use a visual backdrop, and not simply to prevent the camera from picking up whatever potential work-from-home chaos is taking place behind the speaker.

What I'm using as a backdrop today isn't a shot of a particular critical mineral or metal – when the subject is U.S. critical mineral dependency, there are simply too many to choose from -- but fireflies in a field. It's the inspiration for the Firefly Algorithm that determines the optimal

routing protocol for data zipping across a 5G Network. It's an evocative image, and far better than trying to illustrate another 5G concept called "galactic swarm optimization."

Fireflies help us understand a major difference as we step up from 4G to 5G. We're used to mammoth cell towers relaying signals 5 and 10 miles at a time…. 5G is different. Network engineers have even made up a word for it – they say 5G is "densified:" in a space where four 4G towers were sufficient for 100 square miles of coverage, in the new network, thousands – maybe tens of thousands -- of small cell nodes will move our data.

They're the fireflies of 5G.

What's the connection to natural resources? A densified system has a lot of physicality – it requires a lot of advanced materials. If the U.S. is serious about not relying on China's Huawei for our 5G -- with all the risks that would carry for national security -- we and our allies will need to factor that physicality into the network we build.

What are the 5G "Criticals?" Start with a single Heavy Rare Earth – Erbium – for 5G fiber optics. And we'll need Cesium, up to now a niche material in cesium clocks, but in 5G required to speed-gun the network's blinding bit-transfers. We'll need graphite, by the ton, for 5G towers. Gallium – for 5G semiconductor chips. There are more materials, but I'll stop here and make three points:

> First -- the U.S. is 100% import-dependent for each mineral and metal I've just mentioned.
> Second -- in each case, China is the world's largest producer, and
> Third -- the U.S. hosts known resources for each one.

So if the U.S. allows our posture of dependency to persist – with all the negative impacts for our economy and national security -- this is a dependency of our own making.

And it's the same story -- sometimes the same metals -- when we look at semiconductor chips, or the Internet of Things, or Quantum Computing. That's in addition to the materials required for renewable energy, to update and harden our National Grid – and to develop the next generation weapons platforms we depend on to keep the peace, and prevail in conflict.

Materials, Not Magic

Arthur Clarke, the futurist, is famous for saying that "any sufficiently advanced technology is indistinguishable from magic**."** That's true today – true, and incredibly dangerous. Dangerous because it lulls us into thinking that the signals that link our phones, the data we store in the Cloud, that firefly network that defines 5G – are not made, they're not manufactured. They're magic. That's a dangerous disconnect. Particularly now – when the things that make the 21st Century what it is and what it will be – have never required more of the materials buried in the Earth.

So as a mental exercise, I would suggest we don't just fixate on how a metal comes out of the ground – where it comes from -- we look at what that metal goes into, and where it takes us.

But if we've entered the Tech Metals Age, we're not lost without a map in this new world. We can take a page from the successful effort to reverse decades of dependency on foreign oil: The secret to achieving American energy independence? An "all of the above" strategy that didn't pit one form of energy against another, but embraced oil and natural gas and coal and wind and solar and hydro, biofuels and nuclear power. The common denominator: Energy produced in the U.S., by American companies and American workers, with American ingenuity and American investment.

It's time to apply that "all of the above" approach to the Critical Mineral crisis – and it is that. In this context, "all of the above" means finding ways to encourage and incentivize traditional mining and refining -- and recycling -- and reclamation and unconventional recoveries from historic mine tailings. When the U.S. is looking at 100% import-dependencies for 14 of the 35 critical minerals – and more than 50% import-dependence for 31 of them -- we've got to embrace an "all of the above" supply strategy.

That means encouraging lithium recovery from boron tailings as is happening now in California, rare earths and other "Criticals" from coal waste. Looking ahead – it means critical mineral recoveries from red mud in Louisiana, from graphite deposits in Alaska, and even – if Congress can sort out Good Samaritan legislation – critical minerals from Abandoned Mine Lands, where recovery of "Criticals" could solve two problems, providing much-needed domestic supply, and improving the daunting economics of AML cleanups.

As we move further along the supply chain, it means seeing our metals smelters as national assets – encouraging ways to adapt them for a range of critical mineral recoveries. It's happening now in Utah, where rhenium and tellurium – two "Criticals" unlikely to ever be mined in their own right – are being recovered by adding new circuits to copper smelting. And it means prioritizing processing methods versatile enough to accept different feedstocks – as continuous ion exchange has demonstrated, recovering rare earths from a heavy rare earth deposit in Texas, and from Pennsylvania coal waste as well.

Extending "All of the Above" Critical Mineral Development to Federal Policy

The same "all of the above" approach can be extended to the policies Congress puts in place to strengthen domestic critical mineral supply chains – and the actions the Executive Branch takes, beginning with using the tools federal law already provides.

Take the so-called "commitment to purchase" authority, which exists in both the National Defense Stockpile legislation, and in the Defense Production Act's Title III authorities. In the resource development world, "a commitment to purchase" means an offtake agreement: a

contract to purchase a specific mineral over a period of time, with a formula for the price to be paid, and specifications that must be met.

For those of us who respect the power of free markets and don't want government interfering in the market, this isn't a case of picking winners and losers, since offtakes can be offered on a non-exclusive basis: The Government could contract with several developing producers for a priority material, executing the offtake with whichever company provides the material and meets spec.

One last advantage of offtakes: While the commitment of federal dollars is small – likely measured in the low millions, at a time the Federal Government spends around $10 million per minute, every minute of every day – the multiplier effect of offtakes can be significant. That's because a U.S. Government offtake sends a signal – that it finds a material to be of strategic value. It's likely that a company with a Government offtake would leverage that contract for 10 times the offtake amount in private capital -- accelerating project development without added cost to the taxpayer.

In my view, with just with one hour of federal spending, we could transform Critical Mineral development in the United States – and put this country on the path to providing the tech metals the U.S. needs to build a thriving 21st Century Technology Economy.

As for changes in federal policy, I'll limit myself to one -- that could be addressed with an amendment of 10 words, maybe less:

If you look up the federal tax depletion schedule, you'll see 83 materials listed there. Sand and gravel are there. Rip rap is there. Even mollusk shells are in there. But as for what's not mentioned -- Rare Earth Elements are not listed. In fact, 13 of the 35 minerals on the U.S. Government Critical List are not named in the tax depletion schedule – and for 8 of those 13, the U.S. is 100% import-dependent.

If these minerals and metals are Critical…. If we want U.S. companies to explore for them, to mine, refine, reclaim, recycle and otherwise process and produce them – shouldn't we create a tax depletion category for Critical Minerals that reflects their importance?

As I conclude, I'll come full circle: Critical Minerals aren't critical because of where they come from – they're Critical because of where they take us. American ingenuity, innovation and investment can do a lot – but the power of the private-sector can do far more if public policy sends a strong signal that Critical Minerals matter – to the Technology Revolution transforming our world and to America's place as the leader in that transformation.

Thank you.

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