OCEAN MINERALS FORWARD »

China's Critical Minerals Advantage

» Mineral Dependence Can Become Industrial Dependence

Critical minerals are the building blocks of the modern economy. They are essential to American defense systems, semiconductors, data centers, energy infrastructure, advanced manufacturing, transportation, communications, and countless everyday technologies.

But mineral security depends on more than having resources in the ground. **The ability to process and refine those resources — and turn them into materials manufacturers can actually use — is just as important.**

Over several decades, China built enormous capacity across those middle stages of the supply chain. Today, it holds leading positions across the production, processing, and refining of many strategically important minerals.

China's position means that even minerals mined elsewhere can move through Chinese processing and refining before reaching manufacturers around the world. That concentration creates vulnerabilities for countries that depend on reliable access to these materials.

China currently holds major shares of global refined production for several important metals:

- **45%** refined copper
- **35%** refined nickel
- **78%** refined cobalt
- **95%** refined manganese

Source: Bank of Finland Institute for Emerging Economies.

» America Remains Import Dependent

The United States has significant mineral resources of its own, but domestic production and processing have not kept pace with demand.

The result is substantial reliance on foreign sources for minerals that support some of America's most important industries.

12 + 29

The U.S. is 100% net-import reliant for 12 critical minerals — and at least 50% reliant for another 29.

» Supply Concentration Has Consequences

Dependence becomes particularly important when a small number of countries control access to materials that are difficult to replace. China has increasingly used export controls involving strategically important minerals. Controls beginning with gallium and germanium in 2023 were followed by additional restrictions involving materials including antimony and rare earth elements.

Those actions provide a real-world example of how mineral supply chains can become a source of economic and strategic exposure. The potential economic consequences can extend well beyond the value of the minerals themselves.

In one USGS analysis, a modeled complete simultaneous restriction of Chinese net exports of gallium and germanium resulted in an estimated:

$3.4 BILLION reduction in U.S. GDP

The lesson is straightforward: when critical inputs become unavailable, the effects can move downstream through entire industries.

The Competition Is Moving to the Seafloor

China's critical-mineral strategy does not stop at terrestrial resources.

China has also invested in deep-sea research vessels, submersibles, mapping, exploration, scientific research, and other capabilities needed to understand and operate in the deep ocean. It holds exploration contracts covering multiple types of deep-seabed mineral resources through the International Seabed Authority.

These activities build more than knowledge of where minerals are located. They build **environmental data, technology, engineering expertise, operating experience, and a workforce capable of working at extreme ocean depths.**

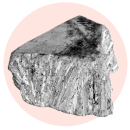
America Has Another Resource Opportunity

Reducing mineral dependence will require more than replacing one foreign supplier or developing one new mine. The United States will need a broader portfolio that includes terrestrial mining, **recycling, allied resources, expanded processing and refining capacity, and new sources of mineral supply.**

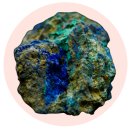
Ocean minerals can become another part of that portfolio. Polymetallic nodules offer a particularly compelling example because a single resource contains several minerals needed across American industry — including nickel, copper, cobalt, manganese, and rare earth elements:



COPPER



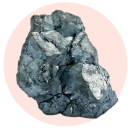
NICKEL



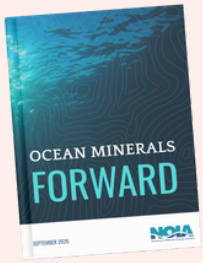
COBALT



MANGANESE



RARE EARTHS



AMERICAN RESOURCES. AMERICAN INNOVATION. AMERICAN INDUSTRY.

Explore the full report and supporting resources at OceanMineralsForward.com

SCAN TO SEE FULL REPORT ONLINE