

Committee on Natural Resources
Subcommittee on Oversight and Investigations
Oversight Hearing
1324 Longworth House Office Building
April 29, 2025
10:15 AM

Oversight Hearing titled "Exploring the Potential of Deep-Sea Mining to Expand American Mineral Production"

Responses to Questions for the Record from Rep. Dexter for Mr. Oliver Gunasekara, CEO, Impossible Metals

1. When up to 70% of benthic life is estimated to depend on nodules, how can we be assured there will not be a major loss of biodiversity under Impossible Metals' (IM) proposals?

Our technology is designed to hover above the seabed, using cutting-edge AI (computer vision) to select nodules that, by location and careful inspection, do not harbor megafauna — exponentially reducing sediment and ecosystem disturbance. This environmentally conscious-by-design approach enables us to leave 30% by mass / 60% by volume of the nodules undisturbed. We regard this as an important way to preserve ecosystems, especially compared to existing alternative sources of critical minerals that can result in significant deforestation, ground and drinking water pollution, and other catastrophic environmental effects.

We seek to play by the rules, and existing law requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions. We expect that this will include Environmental Impact Assessments for seabed mining projects, and that these assessments will specifically address biodiversity impacts based on data that is relevant to the specific project site. These assessments must be submitted to the regulator before a lease sale and typically include public comment periods, assuring all interested parties can provide relevant data.

2. Although projected to be smaller than TMC's, the benthic plume produced by IM will still be sufficient to cover deep sea life forms by far more sediment than they are adapted to. The natural sedimentation rate is only of the order of 1-2 mm/thousand years. How will IM ensure the sediment load it creates at commercial scales does not interfere with the viability of benthic organisms and the ecological services they provide?

The statement "the natural sedimentation rate is only of the order of 1-2 mm/thousand years" is incorrect. This number ignores benthic storms on the seabed floor, which significantly increase the sediment rate.

As Dr. Peacock testified, the sedimentation disturbance of even traditional technologies has been shown to be $\frac{1}{3}$ to $\frac{1}{6}$ of the level hypothesized before actual testing took place. Our modeling shows that our approach will decrease disturbance by an additional order of magnitude, and we will validate this modeling in a deep sea test to demonstrate the lower rate of disturbance. The exploration leasing process will enable further data collection.

It is expected that any lease sale will contain clear, science-based requirements on environmental standards, such as for sediment disturbance. Prospective bidders will document their ability to comply with these standards in advance of a lease sale award, based on data such as the modeling and testing data described above. We also expect monitoring requirements to verify compliance on an ongoing basis.

That said, all forms of mining have impacts on the environment, which is why innovation is critical to reduce these impacts, and why we have designed our systems to be by far the most environmentally sensitive method of securing these critical minerals. Today, 75% of nickel comes from Indonesian rainforests. The rainforest is destroyed to access the nickel laterite ore. We should mine for critical minerals in locations with the least environmental impacts, not the highest, with American environmental and social regulations.

3. Is it correct that for a full-scale deep-sea mining operation you would need around 100 of your mining robots operating at the same time, and if so, what are the implications for animals in the water column of these machines, including from noise and from light?

Using a fleet of small AUVs rather than a single large collector presents both economic and environmental advantages. It reduces the risk of a single point of failure, increasing overall uptime, and allows a distributed fleet of low-impact AUVs to reduce concentrated impacts in a particular location. Nodules can be left behind in a pattern over the whole large collection area, rather than leaving wide swaths of affected areas alternating with rows of untouched areas.

The Eureka III underwater robots will also significantly reduce noise and light impacts compared to alternatives. The noise profile of the AUV is designed to be low, mainly due to the buoyancy pumps and thrusters. We expect the noise from the Eureka III to be significantly less than other systems, including other vessels and offshore drill ships that operate today. Our Eureka III vehicles only turn on their lights when they are hovering above the seabed. The lights are off in the water column. Unlike other approaches, Impossible Metals also does not plan to require dynamic positioning of the support vessel, significantly reducing disturbance in the area closest to the surface, where most ocean life lives.

Expected noise and light impacts would be further elaborated in an Environmental Impact Assessment.

4. How much would it cost to build, operationalize, maintain, and monitor that entire fleet?

Each Eureka III is estimated to cost \$1.8M to build and to have a 25-year life with a regular maintenance program where we spend around \$180K each year on preventive maintenance.

We have published the sixth version of our detailed economic model on our website that outlines the specific costs of building, operationalizing, maintaining, and monitoring the fleet of AUVs over the lifecycle of a representative project. Last updated in March 2025, this includes slides, a webinar, and a detailed spreadsheet.

This [model](#) estimates that a deep sea mining project in the Clarion Clipperton Zone (CCZ) using Impossible Metals' technology at scale would generate \$4 billion in revenue per year and around \$1 billion in profit per year.

5. You claim that your mining will result in minerals that are "10X" cheaper than those that are produced on land. Please explain why that is the case, what you are including in your cost estimates, and how large the error bars are.

The average all-in sustainable (AISC) cost for a nickel mine in 2024 was [\\$14,979](#) per metric ton, including mining and processing costs, according to Woods Mackenzie. Our latest (v6) economic model estimates a cost of \$743 per metric ton of nickel-equivalent metals for a Eureka III system, or approximately 1/20th the cost of the average land-based nickel mine. Due to variation in the price of land nickel mines and alternative potential comparisons, as well as the assumptions involved in any economic model, 10X is a more realistic figure.

Key assumptions include metal pricing, mineral processing costs, royalties, share of nodules left undisturbed, and the cost of alternative sources. More detail is available in the published model and slides. Please see:

<https://impossiblemetals.com/blog/introducing-our-latest-concept-economic-model-v6/>.

6. If you were to receive approval for a permit today, what is your estimate of how long it would be before you would be able to commence exploration activities?

Two to three years.

7. Please explain why you are seeking subsidies from U.S. taxpayers if your mining ventures are projected to be as inexpensive and profitable as you claim.

Congress has the opportunity to accelerate the development of a new industry that will create jobs and ensure that America leads in this field, and that those jobs are created here. It will also ensure the United States has the critical minerals we need for national security.

Government investments in research and development have historically delivered strong returns to the taxpayer in economic growth and associated tax revenue, innovation, and global leadership, and investments in domestic processing capacity would strengthen America's

industrial base and ensure developers do not need to send supplies to foreign countries for processing. This is particularly important for strategic industries like critical minerals.

A RAND Corporation [paper](#) from April 2025 said: “Seabed mining presents an opportunity for the United States and its allies to diversify critical mineral supply chains, bolstering critical mineral supply reliability and security. . . . A global seabed mining industry could produce amounts of nickel and cobalt—key elements for lithium-ion batteries—that are equal to the projected United States demand in 2040.”

8. You argue that it's in the national security interest of the United States to develop processing capabilities in the United States, which is reflected in President Trump's recent Executive Order.

a. How many processing plants would need to be built in the United States to process the minerals you expect to be harvested from the seabed?

Assuming each deep sea mining concession could, at scale, produce 7 million metric tons of dry nodules per year, and 3 concessions are operating concurrently, that would imply 21 million metric tons of nodules per year. Based on CCZ grades and 80% recovery rates, that would imply the following amount of metal produced per year:

	Metal Volume Produced From 21M tons of nodules	Total US demand in 2023	Total world wide demand in 2023
Nickel	215K metric tons	422K metric tons	3.193M metric tons
Cobalt	32K metric tons	8.3K metric tons	205K metric tons
Copper	181K metric tons	1.8M metric tons	26.55M metric tons

Note, demand for these metals is growing at 7.5% CAGR.

An average processing plant will likely process 2-5 million metric tons annually. So the U.S. would need at least 4 plants to process this amount of nodules and satisfy half of the current United States’ demand for nickel, all domestic cobalt demand, and 10% of domestic copper demand.

b. What is the cost of building one of these processing plants?

c. Who will fund these processing plants?

d. What is the timeline for building one of these plants?

Impossible Metals does not plan to build or own the processing plants; we plan to contract with processing plants to process nodules into pure metals. Therefore, we do not have detailed insight into prospective processing plants’ capital costs, financing approaches, and timelines.

e. According to recent analysis, these processing plants will need special retrofitting to be able to most effectively process minerals from polymetallic nodules. Does the United States have the technical knowledge or workforce to do that?

We see three phases for nodules processing:

1. Stockpile nodules in United States locations that have good transport logistics, energy for processing, and close proximity to upstream customers.
2. Reuse existing nickel processing plants in friendly nations like Japan, Australia, and Canada. This will require some retrofitting, but will be performed at existing facilities in friendly locations. This has already been demonstrated without refitting at a Japanese facility.
3. Develop new bespoke mineral processing facilities in the US adjacent to the stockpiles.

The United States may lack all the technical knowledge or workforce for domestic mineral processing facilities, but we have a little time to invest and acquire this knowledge and workforce if Congress and the Administration act.

More broadly, if the United States were to lack seabed mining and processing capabilities over the long term, it would be forfeiting access to what is perhaps the world's largest, most accessible, and lowest environmental impact source of these critical minerals—allowing China and other strategic competitors to control this resource and its economic and strategic benefits.

f. Where will you sell your nodules/minerals before theoretical United States processing plants come online?

As outlined above, we plan to use friendly nation processing facilities in the interim. Even if the processing happened in friendly nations, the offtake could still be sold to the US industrial base.

9. How will you ensure that the minerals and metals coming from your process will not go to Chinese or Chinese-operated or controlled processing plants? How will you differentiate them from those that are processed in China or by Chinese-controlled or operated processing plants?

We have no intention to use Chinese or Chinese-operated or controlled processing plants. Existing federal policy reinforces this intention. The Inflation Reduction Act of 2022 has several applicable tax credits and incentives, but only if the minerals do not come from a foreign entity of concern, e.g., China. Chinese export restrictions and intellectual property policies, and economic barriers between the countries, further decrease the desirability of Chinese processing.