DEEP SEABED MINING

Your Air. Your Water. Your Ocean — The Toxic Risks of Nodule Processing and Transshipment in American Samoa

The Sales Pitch

Industry representatives are proposing that American Samoa can benefit from deep-sea mining without the risks—by processing nodules mined elsewhere or allowing ships to transfer cargo in our waters. In fact, processing and transshipment bring the most severe toxic risks directly to our shores, our air, and our families.

Whose nodules would we process?

The Cook Islands—the nearest potential source—won't begin mining until at least 2032, with no certainty they'll move forward (they are still evaluating the risks). American Samoa is being asked to accept toxic infrastructure now, for nodules that may never arrive, from a country that hasn't decided to mine.

WHAT ARE POLYMETALLIC NODULES?

These potato-sized rocks contain cobalt, nickel, copper, manganese — and also toxic heavy metals and radioactive material. Undisturbed on the ocean floor, they are inert. Brought to shore, crushed, and processed, they become an irreversible hazard to our air, our water, and our food.

CONCERN #1: RADIOACTIVE EXPOSURE FOR OUR COMMUNITY

Processing nodules releases radioactive dust into the air that workers and nearby residents could breathe. Once inhaled, these particles can lodge in the lungs, creating long-term health risks including cancer. If processing occurs in enclosed facilities, radon gas accumulates rapidly, posing additional serious health risks.[1]

CONCERN #2: IMPACTS TO OUR OCEAN AND FOOD SOURCES

Transshipment and dewatering operations can discharge nodule wash water directly into the ocean — whether through accident, equipment failure, or deliberate dumping — specifically into the euphotic zone, the sunlit upper layer where our fish live and feed.[2]

The Metals of Concern:

- **Copper, cadmium, zinc, and lead** in complex combinations that scientists cannot yet fully predict or monitor
- **Manganese** that can alter ocean chemistry over time
- **Rare earth elements** with complex long-term biological effects[3]

What This Could Mean for American Samoa:

- **Bioaccumulation:** These metals can enter small organisms, move up the food chain, and concentrate in the tuna that feeds our families and sustains our economy.[4]
- **Changes to fishing patterns:** Contamination nearshore could affect local fish populations and fishing success.
- **Risk to the tuna industry:** Our ocean economy, which generates $49 million a year in wages and $134 million GDP[5], along with thousands of cannery jobs depend on the purity and reputation of our seafood. Contamination concerns could close markets to American Samoan products.

Once these materials enter the ocean, they can spread through currents and persist in the environment for generations.

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CONCERN #3: OUR PRECIOUS GROUNDWATER

The threat doesn't stop at the water's edge. American Samoa has **126 miles of coastline** and **49,700 residents living primarily in the coastal zone**. Our freshwater lenses provide the drinking water our community depends on.

Any onshore handling of toxic ore creates a potential pathway for heavy metals to leach into the soil and groundwater.

CONCERN #4: UNPROVEN TECHNOLOGY

The industry's claims about technology readiness deserve careful scrutiny[6]:

- **Impossible Metals postponed an important 2026 test indefinitely** due to technology not being ready.[7]
- **Onboard dewatering and slurry management systems remain largely untested** at commercial scale.
- **Vessel-to-vessel transshipment is untested** and prone to cargo spillage, especially in adverse weather
- **Processing facilities require billion-dollar investments** and are typically powered by coal, releasing additional toxic emissions

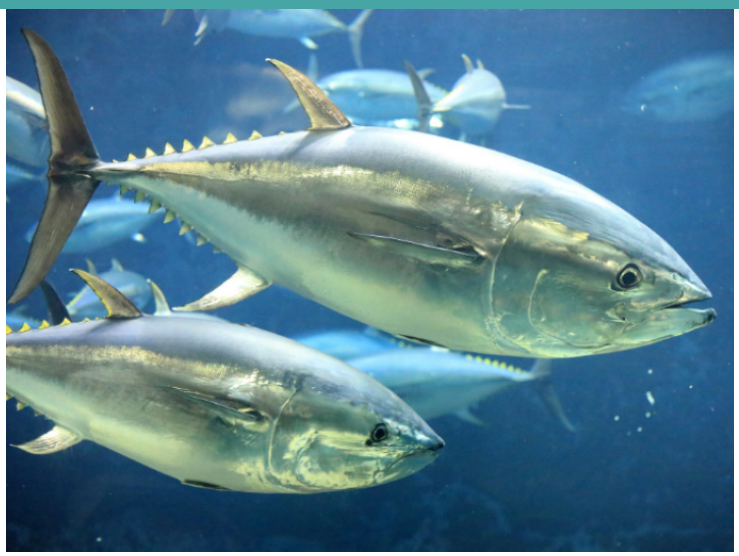
We are being asked to risk everything and bet on technology that has not yet been proven to work safely at scale.

CONCERN #5: DESTRUCTION OF MARINE LIFE AND CULTURAL HERITAGE

The waters around American Samoa serve as **critical habitat and migratory corridors** for species that are part of our natural and cultural heritage:

- **Humpback whales** use these waters as essential wintering grounds where disturbances can affect their communication and health[8]
- **Green sea turtles**, an endangered species, are coastal dwellers here, and migrate through these areas during vulnerable life stages[9]
- **Ancient deep-sea organisms**—corals and sponges thousands of years old—cannot recover once destroyed[10]

Large-scale transshipment operations with continuous vessel traffic, noise, and lighting could alter



the behavior of tuna and other fish, potentially affecting their presence near traditional fishing grounds and increasing costs for local fishermen.

WHAT SCIENCE IS TELLING US

Scientists recently discovered that polymetallic nodules may produce "dark oxygen"—acting as natural batteries that help support deep-sea microbial life, which forms part of the foundation of ocean ecosystems.[11] This discovery was unexpected and reminds us how much we still don't understand about these deep-sea environments.

The more we learn, the more questions arise about the long-term consequences of disturbing these systems.

CONCERNS OUR COMMUNITY MUST WEIGH

- **Massive infrastructure investments** against uncertain returns
- **Potential contamination** of the resources we already depend on
- **Preservation of the economic foundation** that has served us for generations
- **Whether contractors or community** will see financial benefits
- **Long Term Plan -** what happens when the nodules run out?

1 Jessica B. Volz, Walter Geibert, Dennis Köhler, Michiel M. Rutgers van der Loeff and Sabine Kasten. Alpha radiation from polymetallic nodules and potential health risks from deep-sea mining. *Sci Rep* 13, 7985 (2023). doi.org/10.1038/s41598-023-33971-w.

2 Frontiers | Identifying Toxic Impacts of Metals Potentially Released during Deep-Sea Mining—A Synthesis of the Challenges to Quantifying Risk

3 Wang, Wenyu, et al. "Toxic Effects of Rare Earth Elements on Human Health: A Review." *Toxics*, vol. 12, no. 5, Apr. 2024, p. 317. *PubMed Central*, **https://doi.org/10.3390/toxics12050317**.

4 Dowd, M.H., Assad, V.E., Cazares-Nuesser, A.E. et al. Deep-sea mining discharge can disrupt midwater food webs. *Nat Commun* 16, 9575 (2025). **https://doi.org/10.1038/s41467-025-65411-w**

5 AMERICAN SAMOA'S OCEAN ECONOMY 2022, **https://coast.noaa.gov/data/digitalcoast/pdf/marine-economy-as.pdf&ved=2ahUKEwiVpJ2guoqVAxUEqJUCHYEvCAkQFnoECD0QAQ&usg=AOvVaw2g-N1wuTavmQ8I3lLBb1Rq**

6 Seabed Mining Technoeconomic Assessment - Barnard and Trytten.Pdf." *Google Docs*, h**ttps://drive.google.com/file/d/1RettUw5s1sn0rHeyDDj6VzcBcimieY9e/view?usp=embed_facebook**.

7 Impossible Metals announced a January 2026 deep-sea test in collaboration with Germany's Federal Institute for Geosciences (BGR). See: Impossible Metals, "Impossible Metals is Collaborating with BGR," **https://impossiblemetals.com/blog/impossible-metals-is-collaborating-with-bgr-to-test-its-hovering-selective-collection-robot-for-collecting-critical-metals-from-the-seabed/**. Then-CEO Oliver Gunasekara subsequently announced the postponement in February 2025, stating the technology "isn't ready." *Mining.com*, March 19, 2025. **https://www.mining.com/web/deep-sea-miners-are-set-to-dig-for-critical-minerals-even-if-rules-arent-done/**

8 Thompson Kirsten F., Miller Kathryn A., Wacker Jake, Derville Solène, Laing Christopher, Santillo David, Johnston Paul, Urgent assessment needed to evaluate potential impacts on cetaceans from deep seabed mining, *Frontiers in Marine Science*, **https://www.frontiersin.org/articles/10.3389/fmars.2023.1095930**

9 Yao, Wen, et al. "Development of Deep-Sea Mining and Its Environmental Impacts: A Review." *Frontiers in Marine Science*, vol. 12, May 2025. Frontiers, **https://doi.org/10.3389/fmars.2025.1598584**.

10 Silva, Marina; Martins, Ines; Riou, Virginie; Raimundo, Joana; Caetano, Miguel; Bettencourt, Raul; Rakka, Maria; Cerqueira, Teresa; Godinho, Antonio; Morato, Telmo; Colaço, Ana (2022): Mechanical and toxicological effects of deep-sea mining sediment plumes on a habitat-forming cold-water octocoral. Frontiers in Marine Science, 9, 915650, **https://doi.org/10.3389/fmars.2022.915650**

11 Sweetman, Andrew K., et al. "Evidence of Dark Oxygen Production at the Abyssal Seafloor." *Nature Geoscience*, vol. 17, no. 8, Aug. 2024, pp. 737–39. *www.nature.com*, **https://doi.org/10.1038/s41561-024-01480-8**.

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