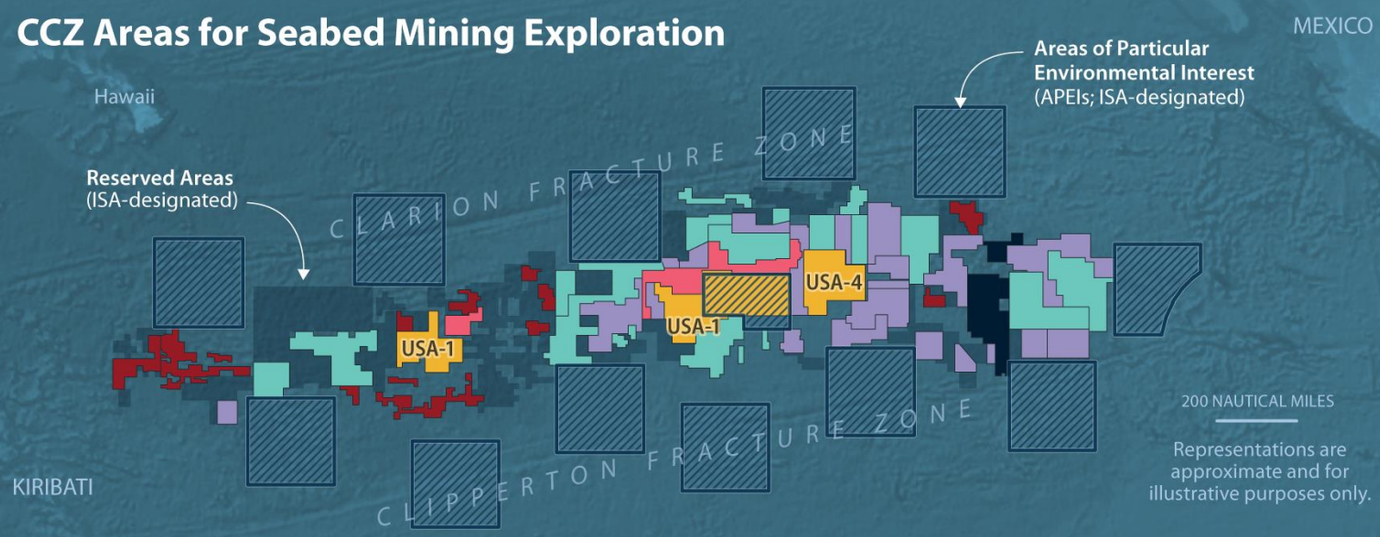
Seabed Mining in the Clarion-Clipperton Zone

Resource demands for energy transition technologies have increased interest in seabed mining. Polymetallic nodules containing critical minerals occur across the global ocean, including in the international Clarion-Clipperton Zone (CCZ). The International Seabed Authority (ISA) issues seabed mining contracts to parties to the U.N. Convention on the Law of the Sea (UNCLOS) and makes certain designations in international areas. As a non-party to UNCLOS, the U.S. seabed mining regime may conflict with the ISA regime. Seabed mining may foster critical mineral supply chain security among the United States and certain countries that hold ISA contracts.

CCZ Areas for Seabed Mining Exploration



U.S. Licenses

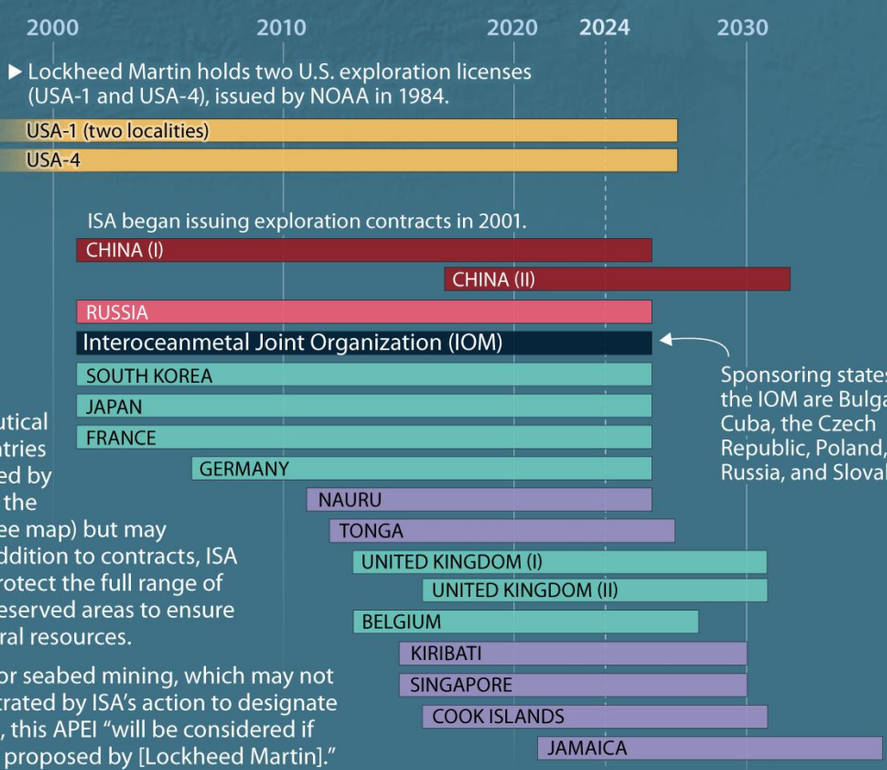
The National Oceanic and Atmospheric Administration (NOAA) issues licenses to U.S. companies under the Deep Seabed Hard Mineral Resources Act (30 U.S.C. §§1441 et seq.).

ISA-Issued Contracts

China *Russia* *IOM*
U.S. Allies *Other Countries*

The ISA, an autonomous organization established in 1994, issues seabed mining contracts for international waters (200 nautical miles beyond a nation's shoreline) to countries party to UNCLOS and companies sponsored by those parties. ISA exploration contracts in the CCZ can include more than one locality (see map) but may not exceed 75,000 square kilometers. In addition to contracts, ISA designates APEIs as no-mining zones to protect the full range of biodiversity and habitats in the CCZ and reserved areas to ensure developing countries have access to mineral resources.

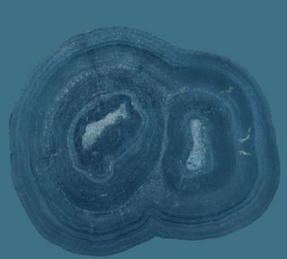
The United States issues its own licenses for seabed mining, which may not be internationally recognized, as demonstrated by ISA's action to designate part of USA-1 an APEI. According to NOAA, this APEI "will be considered if and when at-sea exploration activities are proposed by [Lockheed Martin]."



Polymetallic Nodules (PMNs)

PMNs are potato-shaped rocks lying on the deep seafloor. They form over millions of years as minerals from seawater and sediment pore water accrete around a hard nucleus (e.g., shark tooth), forming concentric layers.

PMNs in the CCZ contain cobalt, copper, manganese, nickel, and other minerals. The extraction of these critical minerals from PMNs may help meet supply demands for energy transition technologies, including electric vehicles, stationary energy storage, electric grid, and wind energy. Some see seabed mining as supporting an energy transition; others consider it unnecessary given the available mineral supply in onshore deposits, current stockpiles, and electronic waste. Concerns have also been raised about seabed mining's cost and environmental impact, as well as the technological readiness of contract holders.



27 Co | 30 Cu | 25 Mn | 28 Ni

Nodule image: Smithsonian Institution.

Sources: ISA, www.isa.org; NOAA, "Deep Seabed Mining: Approval of Exploration License Extensions," 87 *Federal Register* 52743, August 29, 2022; Department of Energy, *Critical Materials Assessment*, July 2023; James R. Hein et al., "Deep-Ocean Polymetallic Nodules as a Resource for Critical Materials," *Nature Reviews Earth & Environment*, vol. 1 (2020), p. 158. **Map:** U.S. licenses based on map in NOAA, *Deep Sea Mining: A Report to Congress*, 1995, p. 6; ISA contracts and designated areas based on ISA data; ESRI.

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