

## Environmental Studies Program: Studies Development Plan | FY 2025–2026

Field	Study Information
Title	Environmental Evaluation of the Critical and Hard Offshore Mineral Programmatic Reference (MM-25-04)
Administered by	Marine Minerals Program (MMP)
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Procurement Type(s)	Cooperative Agreement or Interagency Agreement
Performance Period	FY 2025–2027
Final Report Due	TBD
Date Revised	January 17, 2024
Problem	The U.S. lags behind other developed nations in domestic Critical Minerals (CM) planning and investments. A series of recent Executive Orders recognize this issue and direct Federal agencies to take actions to bolster development of domestic CM resources. BOEM has just recently received an unsolicited request for lease sale along with multiple inquiries about Bureau regulations governing CM leasing and the types of environmental information needed to support such decisions on the Outer Continental Shelf (OCS).
Intervention	Successful management of CM activities is reliant on comprehensive environmental information so that potential impacts may be understood, avoided, minimized, or offset. Potential impacts will vary according to the phase of the life cycle of a development project, which includes prospecting and exploration, site characterization, construction and operations, and post-operations and decommissioning.
Comparison	Most deep-sea environments where CM (i.e., nodules) are found remain relatively unknown, yet a sufficient understanding is legally necessary for National Environmental Policy Act (NEPA) and other statutory requirements. Without adequate baseline information, BOEM won't be able to conduct defensible analyses to inform pre-leasing decisions and apply appropriate post-leasing environmental mitigations and monitoring.
Outcome	Based on this study's findings, develop suggested environmental guidelines for exploration and development for critical minerals.
Context	Deep sea CM (primarily polymetallic nodules) in all U.S. Federal waters but with emphasis on Pacific Ocean locations where nodules are most abundant.

BOEM Information Need(s): Critical mineral (CM) resources under BOEM jurisdiction with the most prevalent industry interest lie in deep water (>500m water depth) on outer continental shelves. These remote resources have vastly different extraction requirements and procedures than traditional sand and gravel resources. Likewise, deep sea CM likely lie in unique environments, which remain relatively unstudied across large spatial regions. Therefore, deep sea critical mineral activities increase the probability of activity in frontier areas, specifically in Pacific islands and Atlantic locations.

This study was originally designed as Phase 2 of a recently completed MMD Critical Minerals Resource Evaluation (Phase 1) study. Phase 1 was a desktop study synthesizing current information for known offshore CM resources, with a primary focus on polymetallic nodules. Phase 1 also included CM economic information, and an industry overview for exploration, extraction, and refining. Phase 2 is designed to be a complementary desktop study that identifies known information of environments associated with the identified offshore CM resources in Phase 1. The two phases are not dependent on each other, but they are intended to complement each other.

This study aims to provide environmental guidelines within the scope of NEPA to assist BOEM's evaluation for future regulatory requests. In particular, in February 2024 BOEM received an unsolicited request for lease sale to harvest nodules off American Samoa; such guidelines will be crucial to assisting BOEM's future reviews and decision-making.

Background: The U.S. is lagging behind other developed nations in domestic CM planning and investments. A series of recent Executive Orders (EO 14017, EO 13953, and EO 13817) recognize this issue and direct Federal agencies to take actions to bolster development of domestic CM resources. BOEM has received inquiries about Bureau regulations governing CM leasing and the types of environmental information needed to support such decisions on the Outer Continental Shelf (OCS).

The International Seabed Authority (ISA) is the intergovernmental body that oversees mineral activities on the seafloor beyond national jurisdiction. It is charged with both development of seabed mineral resources and protection of the marine environment. The ISA is currently developing regulations, including those related to the environment, for the exploitation phase of seabed mining; those for the exploration phase already exist (i.e., ISA, 2020). This international "Mining Code" provides a starting point for this study to adapt relevant pieces to a domestic perspective, especially as the U.S. continually provides feedback on the developing regulations.

Successful management of CM activities is reliant on comprehensive environmental information so that potential impacts may be understood, avoided, minimized, or offset. Potential impacts will vary according to the phase of the life cycle of a development project, which includes prospecting and exploration, site characterization, construction and operations, and post-operations and decommissioning. Prospecting and exploration is the first stage to locate CM deposits and is usually performed over a wide area. Techniques include remote sensing technologies and spot sampling to search for, sample, study, and analyze CM deposits to investigate whether those minerals can be commercially exploited. Site characterization includes the description of any environmental component necessary to assess the site for development. Construction and operations includes all activities associated with the extraction and removal of CM deposits for commercial purposes including operations, mineral processing, and transportation to land. Post-operations and decommissioning include the final phase when CM extraction operations cease and includes removal of infrastructure, site clearance, and rehabilitation (where possible).

Objective(s):

- Compile, assess, and summarize best practices and standards for deep-sea environmental data and sample collection, analysis, and curation.
- Identify, compile, consolidate, and summarize existing governmental, industry, academic, and non-governmental data and information needed to assess and monitor impacts associated with each lifecycle phase of a CM project (prospecting; exploration and site characterization;

construction and operations; decommissioning) and the associated habitats, ecological patterns, and environmental baselines against which impacts can be analyzed.

- Based on this study's findings, develop suggested environmental guidelines for analysis of exploration and development for critical and other hard minerals, with a focus on prospecting of polymetallic nodules.

Methods: Desktop study based on current literature, review of analogue industries, and international policies that may be adapted for NEPA-related assessments.

Specific Research Question(s):

1. What are best practices for deep-sea data collection, sampling, and sample preservation?
2. What information is already published on existing environmental conditions proximal to critical mineral resources within BOEM jurisdictions?
3. What are the Impact Producing Factors (IPFs) for each phase of a critical mineral project (1) prospecting and exploration; (2) site characterization; (3) construction and operations; and (4) post-operations and decommissioning)?
4. What modifications are necessary to adapt existing processes, whether external or internal, to environmental assessment?
5. What modifications are necessary to adapt existing processes for monitoring of the deepwater seabed and the overlying and proximally adjacent water column?

Current Status: N/A

Publications Completed: Phase 1 was completed December 2023, and the final report is currently under review for publication.

Affiliated WWW Sites: N/A

References: N/A