Legal and Technical Commission considerations on the China Minmetals Corporation (CMC) Environmental Impact Statement

Background to the activities

China Minmetals Corporation ("CMC") plans to carry out testing of their prototype nodule collector vehicle in July-October of 2025 in the Block A-5 of the CMC Contract Area in the Clarion-Clipperton Zone (CCZ).

The objectives for the test are two-fold. The first is to test the prototype collector vehicle ("PCV"), and the second is to monitor and assess the environmental impact of the PCV.

The planned test contains two separate sets of underwater operations. The first set of operations will test the half commercial size PCV's basic functions. This will last for 70 hours, with an underwater traveling distance of 4,840 m and a disturbance area of 24,200 m^2. The second set of operations will test the collector vehicle's basic performance while traveling and collecting nodules. This will last for 60 hours, with an underwater traveling distance of 15,160 m and a disturbance area of 75,800 m^2.

The total area of disturbance area for the two tests is expected to be about 100,000 km^2 (0.1 km^2) in a Collector Test Area ("CTA") of 0.6km^2. The total wet weight of nodules that will be collected is estimated to be 1,300 t, and that lifted alongside with the collector vehicle to the surface platform is expected to be no more than 10 t.

The maximum impact range of the plume is expected to be 2.1 km horizontally and up to 124 m vertically. The range of sediment plume redeposition with thickness greater than 0.1 mm is expected to be no more than 1 km^2. The plume is expected to last for 1-1.5 days after the test.

Commentary on the completeness, accuracy and statistical reliability of the EIS

This is a well organised and well written EIS that contains the content required in Annex III of ISBA/25/LTC/6/Rev.3. We note that the Applicant has incorporated both suggestions from its public consultation and comments from the Secretariat.

Below are comments on areas where the Commission felt the EIS (and especially the monitoring plans) need to include more detail, or where certain aspects need further consideration by CMC.

Completeness of the evidence base presented

The Commission notes that, in a number of places through the document, the Applicant does not use the full range of literature sources available to them. For example, there is no consideration of Wedding *et al*. (2013)[1] and Simon-Lledo *et al*. (2023)[2] in the discussion of biogeographic patterns and no consideration of Southall *et al*. (2019)[3] or NMFS (2024)[4] in the assessment of noise relating to marine mammals. Further, there is no use of literature related to GSR's Patania II trial.

[1] Wedding LM, Friedlander AM, Kittinger JN, Watling L, Gaines SD, Bennett M, Hardy SM, Smith CR. From principles to practice: a spatial approach to systematic conservation planning in the deep sea. Proc Biol Sci. 2013 Nov 6;280(1773):20131684. doi: 10.1098/rspb.2013.1684.

[2] Simon-Lledó, E., Amon, D.J., Bribiesca-Contreras, G. *et al.* Carbonate compensation depth drives abyssal biogeography in the northeast Pacific. *Nat Ecol Evol* **7**, 1388–1397 (2023). https://doi.org/10.1038/s41559-023-02122-9

[3] Southall, Brandon & Bowles, Ann & Ellison, William & Finneran, J.J. & Gentry, R.L. & Green, C.R. & Kastak, C.R. & Ketten, Darlene & Miller, James & Nachtigall, Paul & Richardson, W. & Thomas, Jeanette & Tyack, Peter. (2007). Marine mammal noise exposure criteria. Aquat. Mamm. 33. 10.1121/AT.2021.17.2.52.

[4] National Marine Fisheries Service. 2024. Update to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0): Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts. US Dept of Commer, NOAA. NOAA Technical Memorandum NMFS-OPR-71.

The Commission also noted that in several places the document does not consider the most up-to-date literature. An example of this is where the development of their predictive models of sedimentation and recovery does not seem to use recent papers to inform the models.

While detailed methods used in undertaking the Plan of Work are generally provided in Annual Reports, it is noted that an EIS should be a stand-alone document, particularly given that Annual Reports are not publicly available. When it would help the reader in understanding impact, the Commission suggested that methods are included in appendixes, or that links are provided to open access sources containing those methods. An example here would be methods for zooplankton sampling, where it was uncertain whether the mesh sizes used are adequate.

Baseline data

A major limitation with this EIS is the low sampling numbers initially proposed by CMC, which makes it difficult to understand spatial scale within the level of the CTA and in particular the impact reference zone ("IRZ"). Much of the EIS baseline and impact assessment is based on data collected by other contractors, in particular Nauru Ocean Resources Inc (NORI).

It is essential that the survey design agreed by CMC considers this issue as we do not believe that the current level of baseline data would allow for enough resolution within the monitoring plan to allow change to be quantified and assessed after test activities. In particular, it is difficult to get an idea of smaller-scale spatial variability.

This affects a number of faunal groups.

- For the microbial baseline, the EIS notes that results were obtained from 2 stations using 1 multicorer and 1 box corer each in the A-5 Block in the 2021 surveys, as well as 2 multicorer stations in the IRZ and 2 in the preservation reference zone ("PRZ") in the 2023 survey.
- For meiofauna, sampling consisted of 2 stations with 2 multicorer deployments each in the IRZ (2021 survey) and 2 multicorer deployments at 1 station in the PRZ (2019 survey).
- In terms of macrofauna, we recommend that CMC follows the same faunal groupings as other contractors, particularly in including copepods in meiofauna rather than macrofauna. This will be important for making robust comparisons. We also consider the level of sampling (1 boxcore deployment at 2 stations in the IRZ during the 2021 survey and 1 box corer at 1 station in the PRZ during the 2019 survey) is too low.
- Megafaunal data are based on 4 video transects, 2 in the PRZ, 2 in the IRZ. CMC has undertaken some comparison of composition within the IRZ and PRZ by 'section', which show some differences. However, the sections are so large that the IRZ is one section, as is the PRZ. While the Principal Components Analysis addresses that to an extent, the level of replication remains low and that constrains the adequacy of the analyses.
- Baseline data on nodule fauna was felt to be equally insufficient. Most of the stations analysed are north and east of the IRZ / PRZ. It is also not clear in the EIS what CMC identify as nodule fauna, or whether there was any quantitative assessment of community composition. There is also no information provided on nodule crevice fauna.
- Finally, scavenger data are based on either 1 or 2 baited trap(s) in IRZ and either 1 or 2 baited trap(s) in the PRZ. We do, however, note the heavy metal analyses for 2 rattails which will contribute to study of food web linkages.

CMC notes from their baseline studies that abundance is similar between the IRZ and PRZ. However, this needs to be substantiated with appropriate statistical tests and sufficient replication in each zone (≥3). Furthermore, as the PRZ and IRZ were sampled in different years, conclusions about spatial variability (IRZ vs. PRZ) would need to be based on samples collected in the same period, as to exclude potential effects of natural temporal variability.

An enlarged map with clearly marked sampling or observation stations is strongly recommended, particularly for the conducted environmental baseline studies. While the current provided maps in the report include these stations, they are difficult to check for spatial coverage.

Taxonomic resolution

Currently, there is not enough sampling data to determine the appropriate taxonomic resolution for understanding uniformity or heterogeneity within the target mining area (TMA) and the IRZ, leading to phylum-level comparisons between sites, and to assess ecosystem function. Even where statistical tests were undertaken, this is not detailed enough to robustly understand ecosystem changes. Comparing community composition on higher taxon level does not provide insights into patterns in community composition and structure.

This is particularly clear when it comes to comparing the IRZ and PRZ, and therefore in future, for detecting change.

Noise and light

The Commission had concerns that CMC had not considered all sources of impacts on the environment. In particular, the noise output from the transponder / USBL system was not included, nor was an assessment of the impact of noise from the surface vessel on marine mammals. These were provided to CMC as questions, and CMC answered clearly and fully about their expectations regarding noise. They highlighted that they have not previously conducted a direct quantitative assessment of ship noise impacts on cetaceans but will be obtaining noise data from the test system, the ship and hydrophones on moorings to improve their understanding of this area.

Monitoring design

CMC confirms that it will conduct comprehensive environmental monitoring for the bottom layer prior to, during and following the test. This includes collector instrumentation, ROV sampling, environmental monitoring arrays of static equipment around the CTA, shipboard sampling, and long-term moorings. The Commission notes the flexibility of options built into the plan.

To ensure that this happens, the Commission strongly recommended that the monitoring design needs to be more extensive, particularly in providing better small scale spatial coverage within the IRZ. Understanding the spatial scale of variability is very important in determining changes associated with mining. In terms of AUV transects, and it was suggested to consider more closely spaced shorter transects around the CTA. In terms of coring, the Commission suggested that undertaking only a linear arrangement of sampling points through the IRZ is not robust enough, and that a network of coring sampling points would be more appropriate.

Key to the success of the monitoring scheme is to implement a robust gradient design within the IRZ. While it was agreed that the focus of sampling should be close to the edge of the CTA, having just 2 stations inside the CTA gives little power to determine the gradient from inside to outside. Hence the Commission recommended more effort is devoted to sampling sediment fauna in the pre- and post-survey stages.

The Commission understands that the PRZ will be important for baseline data collection in future testing. If time is an issue, we would recommend that less effort is expended in the PRZ to compensate for increased density and distribution of sampling in the IRZ.

The commitment to long-term monitoring and evaluating recovery dynamics is impressive but also highlights the importance of monitoring as much as possible inside the IRZ during the test period. In that way, there is a greater chance of measuring changes due to the disturbance.

It was recommended that CMC further considers the use of an epibenthic sled to sample hyperbenthos, rather than just relying on eDNA.

Questions concerning these important monitoring issues were provided to CMC. The Commission asked whether CMC would consider revising the focus of the monitoring to concentrate on the IRZ, even if this means reducing operations in the PRZ, and whether CMC would consider undertaking a greater number of shorter AUV transects and increasing density of sampling stations in both the CTA and the IRZ. A further question we asked was whether CMC would consider sampling the hyperbenthos.

CMC responded that they could move some sampling stations originally planned for the PRZ to the IRZ. These samples will be analyzed for biological parameters such as microorganisms, chlorophyll, and environmental DNA. They will also attempt to change the original five survey lines to shorter lines, particularly to add more spatially dispersed detection of pre- and post-test changes within the IRZ.

The Commission noted these replies, which took account of its initial comments.