Legal and Technical Commission considerations on the Beijing Pioneer Hi-Tech Development Corporation (BPC) Environmental Impact Statement

Background to the activities

Beijing Pioneer High-tech Development Co ("BPC") plans to conduct a 1:5 scale polymetallic nodule deep-sea collection and buffer station joint test. This will occur in the southern foothills of Magoshichi Guyot in Block M2 of the Northwest Pacific polymetallic nodule contract area and will occur in the second half of 2025.

BPC have presented a novel system for mineral collection, consisting of three parts. The Manta II collector is carried within a gantry-type electric ROV, and only the collection head is expected to make contact with the seafloor. There is then a horizontal transport hose transferring nodules to a buffer station some distance away.

The objectives for the test are three-fold:

(1) To validate the operational capability and collection efficiency of the 1:5 scale collector.
(2) To verify the pumping capacity of the simulated buffer station per unit time.
(3) To validate the collaborative operational capability of the collector, simulated buffer station, and hoses.

There are no environmental objectives mentioned for the Environmental Impact Statement ("EIS").

The sea trials of the nodule collector test machine will last approximately 30 days and will include 100.5 hours of underwater mineral collection testing. The collection trajectory will extend up to 31.5 km. The test will be conducted within a 0.25 km^2 test area (0.5 km × 0.5 km). The depth of disturbance is expected to be about 6 cm of surface sediment. The sediment plume from the collector test area ("CTA") is predicted to have a maximum vertical dispersion of 230 m above the seafloor (though most model simulations were lower) and has a maximum diffusion distance of 5.4 km. Up to 7500 tons of wet nodules will be collected, and none of these will be lifted to the surface.

Overall comment

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 an earlier stakeholder consultation and comments from the Secretariat.

The LTC reviewed the initial application, and submitted comments and a number of questions to BPC in March, and again in June 2025. These covered the impact of the collector and transfer hoses, the adequacy of baseline environmental data, sampling design for pre- and post-test monitoring, and planned processing and analysis of the data. BPC responded to all the questions, providing clarifications as well as revising and adding elements to its monitoring design.

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

Technology

The Commission requested a number of clarifications from BPC concerning their proposed technology, particularly regarding the diameter of the transfer hose compared to the size of the nodules and whether all impacts expected to occur from operations are assessed in the EIS. BPC confirmed that buoyancy is maintained in the hose whether empty or containing nodules. BPC also confirmed that the pipe system will stay fully connected through the test.

Baseline data

The impact reference zone ("IRZ") is located a considerable distance (78 km) from the preservation reference zone ("PRZ"), raising questions as to the suitability of the latter for long-term baseline monitoring to evaluate impacts of future test or commercial mining. BPC noted from their baseline studies that abundance is similar between the IRZ and PRZ. However, this needs to be substantiated with sufficient replication of sampling in each zone and appropriate statistical tests.

The Commission noted that there is a lack of spatial resolution within block M for several faunal groups. With both the IRZ and PRZ in Block M (M1 being the PRZ and M2 being the IRZ), providing data only for Block M does not allow understanding of differences (or similarities) between the two areas. For pelagic communities it is necessary to better sample and understand patterns in community composition and structure with depth and topography.

Overall, the Commission regarded the PRZ as inadequate for being an appropriate comparative area for the IRZ in the collector test phase (see below). Nevertheless, it was satisfied with the specification of activities at a near-field "control site" within the IRZ. This reduced the need for the IRZ and PRZ data to be directly equivalent for the test, but consideration is still needed to evaluate the longer-term utility of the PRZ.

The Commission also noted that analyses are not always undertaken at appropriate taxonomic levels. Phylum-level comparisons were used to describe uniformity and heterogeneity within the CTA and the IRZ. The same phylum-level was used to assess ecosystem function. Even where statistical tests were undertaken, these were not detailed enough to robustly assess ecosystem changes. Comparing community compositions at higher taxonomic level does not provide detailed insights into spatial or temporal patterns and changes in community composition and structure.

BPC also reported unexpectedly low diversity in some samples (such as only 3 species of macrofauna in a particular box core). In order to avoid an incomplete view of biodiversity, the Commission recommended ensuring all taxa are identified and named through the use of WoRMS (World Register of Marine Species; https://www.marinespecies.org/).

Test impact Sampling sites

The Commission and BPC had several exchanges about whether current sampling in the IRZ and PRZ would be useful to cover an appropriate gradient of impact from the test. As noted above, BPC agreed to add an extra control site closer to the IRZ, meaning there would be less reliance on the PRZ for understanding impacts from the collector test. The Commission suggested that intensive sampling using standardized technologies and approaches would be needed to establish the nature and resolution of small-scale spatial heterogeneity in both zones. BPC affirmed that they will follow ISA and ISO guidance for design of sampling stations and statistical data requirements.

The Commission also noted the value of flexibility in where moorings/landers can be placed, or shifted during the test. Patania II testing in the CCZ highlighted the advantages of having this flexibility where current flow, flocculation, etc, meant the plume models were not as accurate as anticipated, and the survey design needed to be revised. While this is planned based on the pre-test survey, over the 30 days of the testing placement may need altering. Landers can readily be recovered and reset, but this is difficult with mooring arrays.

The Commission further noted the importance of ensuring that all impacts from the test were considered in the EIS and in future monitoring efforts. Over the course of interactions with BPC, they increased their planned AUV coverage to aid monitoring impacts through imagery and an array of environmental sensors.

Plumes

Given the expectation that the plume could disperse over 200m into the water column, the Commission requested that the Contractor enhanced its measurement and sampling strategy for the upper parts of the plume in order to improve identification of plume spread and robust assessment of the full impacts of plume dispersal. BPC agreed to add 300 kHz ADCP nodes to enhance observations of the upper part of the plume, as well as to add CTD sampling of the upper part of the plume.

The Commission noted that the planned sediment traps at 500m and 2000m off the bottom near the seamounts were unlikely to pick up any bottom-generated plume, and recommended that they sample closer to the bottom. Here there was some confusion in the objectives of these moorings, and BPC confirmed they are not directly related to the collector test.

BPC also confirmed that they would carry out plume dispersion simulation during the test based on the current data transmitted back in real time, and adjust the arrangement of the monitoring plan according to the simulation results. If on-site monitoring results indicated that the amount of sediment disturbance exceeded modelling results, they would end the test.

Monitoring plan

The proposed monitoring plan focused on the area of the IRZ outside the CTA, and emphasised a linear set of monitoring positions along the axis of the predicted plume spreading. Separate survey work would occur in the PRZ. The number of stations, their distribution and the degree of replication was limited, leading to concerns about the survey design within the IRZ.

Questions concerning these important monitoring issues were provided to BPC. The Commission asked whether BPC would consider revising the focus of the monitoring to concentrate on the IRZ, even if this means reducing operations in the PRZ. The Commission emphasised the importance of a full baseline survey in the weeks prior to the test, covering CTA and IRZ as priorities, only then considering the PRZ for future baseline monitoring. The Commission also asked whether BPC would consider repeating the higher density of sampling undertaken in 2024 in the sampling planned for 2025, and undertaking more of a grid pattern to detect the gradient in more planes; whether BPC would consider more stations in the CTA would better enable analyses of the impact of the vehicles in different modes during the test; whether this improved design would be ready pre-test; and whether the hyperbenthos would be directly sampled. The Commission also asked whether BPC would undertake a prioritisation exercise to focus on what baseline data are most important to monitor the test impacts.

BPC agreed that pre-test baseline surveys were very important and that they would sample the CTA, IRZ and PRZ to further supplement the environmental baseline. While they did not initially plan to repeat the higher density of sampling in 2024 in pre-trial surveys, following exchanges between the Commission and BPC, the contractor will now increase benthic sampling surveys at the newly created control site in 2025 to match those of a preceding survey in 2024. If timing during the test allows, BPC will consider sampling additional stations to monitor the environmental impacts of the equipment in different test modes. They will also adjust the deployment locations of monitoring equipment based on short-term bottom current observation pre-test.

BPC expressed concern that sampling epi- and hyperbenthic fauna prior to the test may interfere with the ability to accurately assess the test's impacts. However, BPC proposed that, where feasible, the sampling of epi- and hyper-benthos would be conducted after the test. The Commission acknowledged this would allow these fauna to be identified, and changes due to the test in composition to be interpreted in conjunction with optical and acoustic monitoring data.

The Commission noted that throughout the exchanges, BPC have carefully considered the Commission's questions and comments and have made significant improvements in their monitoring plan in response to those comments and questions. Nevertheless, the Commission retains some

reservations about the number and density of sampling stations, and whether these will support sufficiently robust analysis of impacts of the test to distinguish them from the considerable natural temporal or spatial variability in BPC baseline data. However, BPC have assured the Commission that these concerns will be taken into account.

Position of IRZ/PRZ and Transboundary Considerations

The IRZ and PRZ have been clearly defined; however, their locations are in close proximity to other contract areas. In particular, the CTA is situated approximately 50 km from the Republic of Korea's CFC contract blocks. While this distance seems sufficient to avoid transboundary issues during the current test, the close proximity of the CTA and IRZ to the neighbouring contract area could raise concerns regarding potential transboundary impacts arising from future activities by either contractor. Such proximity may complicate the identification of the source of environmental effects, especially if overlapping impacts occur. This highlights the need for robust monitoring protocols and appropriate mitigation measures to address possible cross-boundary impacts.