



CARMU Inspection Report 05/2024

Contractor: Republic of Korea

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Acronyms

AI	Artificial Intelligence
CARMU	Compliance Assurance and Regulatory Management Unit
CCZ	Clarion-Clipperton Fracture Zone
CFC	Cobalt-rich Ferromanganese Crusts
CSEM	Controlled Source Electromagnetics
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
EOSG	Executive Office of the Secretary General
GSR	Global Sea Mineral Resources
ISA	International Seabed Authority
KIGAM	Korea Institute of Geoscience and Minerals Resources
KIMST	Korea Institute of Marine Science and Technology
KIOST	Korea Institute of Ocean Science and Technology
KRISO	Korea Research Institute of Ships and Ocean Engineering
LTC	Legal and Technical Commission
MBBRD	Marine Biotechnology and the Bioresource Research Department
MERD	Marine Environment Research Department
MOF	Ministry of Oceans and Fisheries
NORI	Nauru Ocean Resources Incorporation
OGRD	Ocean Georesources Research Department
PMN	Polymetallic Nodules
PMN Regulations	Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area
PMS	Polymetallic Sulphides
PMS Regulations	Regulations on Prospecting and Exploration for Polymetallic Sulphides in the Area
POW	Plan of Work
ROK	Republic of Korea
SOPs	Standard Operating Procedures
UNCLOS	United Nations Convention on the Law of the Sea

I. Introduction

1. The Government of the Republic of Korea (the Contractor)¹ holds three separate contracts for exploration in the Area for three types of mineral resources, signed with the International Seabed Authority (ISA). The contract for the exploration of polymetallic nodules (PMN) was signed on 27 April 2001 for 15 years in accordance with the Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area (PMN Regulations). This contract was extended for 5 years in 2016 and for another 5 years in 2021. The contract for the exploration for polymetallic sulphides (PMS) was signed on 24 June 2014 for 15 years in accordance with the Regulations on Prospecting and Exploration for Polymetallic Sulphides in the Area (PMS Regulations). The contract for the exploration for cobalt-rich ferromanganese crusts (CFC) was signed on 27 March 2018 for 15 years in accordance with the Regulations on Prospecting and Exploration for Cobalt-rich Ferromanganese Crusts in the Area (CFC Regulations).

2. After the review of the Contractor's PMN annual reports for the last three years (2021-2023), PMS annual reports for the last 4 years (2020-2023), and CFC annual reports for the last 5 years (2019-2023) and the observations and recommendations shared with the Contractor in relation to the implementation of its programme of work under each contract, the Secretariat proposed to carry out an inspection, using risk-based approach, on the Contractor's three exploration contracts. Following discussions with the Contractor and its technical partner, Korea Institute for Ocean Science and Technology (KIOST), it was agreed to conduct the in-person inspection meeting on 26 September 2024. This inspection was scheduled to coincide with the visit by two Secretariat's staff to attend the 7th Annual Contractors' Meeting in Busan, Republic of Korea (ROK). On 10 September 2024, the Secretary-General notified the Contractor through three letters (one for each contract) of the Secretariat's intention to conduct the inspection on its three contracts on 26 September 2024. Copies of the three notification letters are provided in Annex 2 of this report.

3. The Secretariat, through its Compliance Assurance and Regulatory Management Unit (CARMU), conducted a supervisory in-person inspection meeting on 26 September 2024 at the KIOST headquarters in Busan. This inspection aimed at obtaining information on the implementation of the Contractor's plans of work for its (i) PMN contract for the current five-year period, which will expire on 26 April 2026; (ii) PMS contract for the last five-year period, which lapsed on 23 June 2024; and (iii) CFC contract for the last five-year period, which expired on 26 March 2023. This inspection also focused on assessing ROK's current and future exploration strategies for its three contracts.

II. Legal and policy context

4. Under article 162(2)(1) of the United Nations Convention on the Law of the Sea (UNCLOS), the Council shall exercise control over activities in the Area in accordance with article 153(4) of UNCLOS and the rules, regulations, and procedures of ISA. Under this article, ISA is

¹ The Contractor also refers to the close collaboration between the Government of the Republic of Korea (ROK) and KIOST in fulfilling its contractual obligations for its current PMN, PMS and CFC exploration contracts.

required to exercise such control over activities in the Area as is necessary for the purpose of securing compliance with the relevant provisions of Part XI of UNCLOS and the annexes relating thereto, and the rules, regulations and procedures of ISA, and approved plans of work (POWs) for exploration.² Consistent with the Decision of the Council of 8 November 2023 (ISBA/28/C/27), the Secretary-General is to report to the Council on an annual basis in respect of alleged instances of non-compliance. Accordingly, the Secretariat is required to monitor the fulfilment of Contractors' contractual obligations with respect to the implementation of their respective POWs.

5. The POW for exploration is the fundamental document by which a Contractor sets out the objectives and activities of its proposed exploration programme. It is approved for the entire lifespan of the contract which spreads over a period of 15 years. Once approved by the Council, the POW represents the core of the contract and the fundamental element against which the Contractor's performance and compliance are assessed.

6. The 15-year period of each contract is generally divided in three 5-year periods. Each of them sets out the different activities that the Contractor has committed to undertake and normally covers mineral exploration, environmental baseline studies, resource assessment, mining technology and ore processing technology development, and economic evaluation. The first period of five years is usually used to enable the Contractor to focus its exploration activities on gathering basic information on geology, geomorphology, mineral resources and collecting environmental baseline data. The data and information collected normally inform the identification of priority areas for advanced exploration activities.

7. Progress is reported by the Contractor to the Secretary-General via the submission of annual reports (Standard Clause 10.1). Additionally, the Contractor and the Secretary-General jointly undertake a periodic review every five years, at the junction of each 5-year period, to assess the results and review the implementation of the POW for exploration (Standard Clause 4.4).

8. The primary responsibility of the Contractor is to comply with the terms of the contract signed with ISA. In so doing, it must also implement, as far as reasonably practicable, any recommendations for guidance that may be issued from time to time by the Legal and Technical Commission (LTC). The Contractor also has the responsibility to report promptly any incident arising from its activities which "have caused, are causing or pose a threat of serious harm to the marine environment" (Regulation 33 of the PMN Regulations)³, (Regulation 35 of the PMS Regulations)⁴, and (Regulation 35 of the CFC Regulations).⁵

9. Monitoring of compliance with approved POWs for exploration in the form of contracts is also one of the functions of ISA pursuant to section 1(5)(c) of the annex to the Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982 (1994 Agreement). Until recently, the primary monitoring mechanisms used by ISA were the annual reports submitted by Contractors pursuant to Standard Clause 10 of the standard clauses for exploration contracts, and the periodic reviews of the POWs for exploration

² See ISBA/24/C/4.

³ See ISBA/19/C/17.

⁴ See ISBA/16/A/12/Rev.1.

⁵ See ISBA/18/A/11.

required under Standard Clause 4.4. The various organs of ISA have specific and clearly defined roles and responsibilities in that regard.

10. The responsibilities of the Secretary-General in relation to monitoring compliance with POWs for exploration, as set out in UNCLOS, the 1994 Agreement, the regulations, and the standard clauses for exploration contracts, include inspecting vessels and installations (Standard Clause 14.2), and providing relevant information to the Contractor and Sponsoring State(s) arising from the inspection reports (Standard Clause 14.7). The Council has requested the Secretary-General to report to it on an annual basis, identifying instances of alleged non-compliance of exploration contractors.⁶ The operational unit of the Secretariat that is responsible for the implementation of the Secretary-General's responsibilities with respect to monitoring and reporting on the activities of Contractors is the Compliance Assurance and Regulatory Management Unit (CARMU).⁷

11. In due time, the Council will be required to establish an appropriate inspection mechanism pursuant to article 162(2)(z) of UNCLOS. Although such an inspection mechanism does not exist at present, it is expected that the establishment thereof will be addressed in the context of the exploitation regulations.

III. Objective, Scope, and Methodology

3.1 Objectives of the inspection

12. The overall objective of the inspection is to review the Contractor's level of accomplishment against its programme of activities and assess its progress in specific areas such as annual reporting, responses to LTC questions and recommendations, technology development, data management, and current and future exploration strategies in fulfilling its contractual obligations. It is also an opportunity for the Secretariat to respond to the Contractor's questions and to highlight key observations and provide suggestions for improvement.

3.2 Scope of the inspection

13. The inspection scope covered the following areas: (i) organisational setting (structure, capacity and competence, and funding); (ii) partnerships (MOF-KIOST partnership, other partnerships); (iii) management systems, including policies and procedures, standard operating procedures (SOPs), and risk/incident management; (iv) programme of activities (preparation, review and actual implementation); (v) annual reporting (internal procedures, alignment to ISA reporting guidelines and templates, data and information reporting); (vi) resource estimation (resource data and information), method of resource estimation, resource estimation update); (vii) technology development (update on technology development, collaboration); (viii) data management (data ownership and contractor's obligation, and data submission); (ix) responses to LTC comments and recommendations (quality of responses, questions specific to each contract); and (x) exploration strategy (short-long term priorities, transition to exploitation, challenges).

⁶ See ISBA/24/C/22, para. 9.

⁷ See ISBA/ST/SGB/2022/2.

3.3 Methodology

14. At the outset, CARMU conducted a review of relevant data and information such as the Contractor's annual reports, including its responses to the LTC questions and recommendations, and the 5-year periodic review reports to inform the objective and scope of this inspection.

15. An inspection plan was developed by CARMU outlining relevant elements of the proposed inspection to guide and help both parties to prepare for the inspection. It was shared with the Contractor and after receiving its feedback the plan was finalised on 13 September 2024.

16. Questionnaires, containing both general and specific questions to each contract, were prepared to guide the meeting and the interaction between CARMU and the Contractor.

17. The inspection was conducted by CARMU during an in-person meeting that was held at the KIOST headquarters in Busan on 26 September 2024. A senior representative of the Contractor's Ministry of Oceans and Fisheries (MOF) and six senior representatives of KIOST were present during this inspection meeting. The Contractor had authorised KIOST to coordinate the inspection and lead the discussions with CARMU.

18. The inspection included presentations by the Contractor pertaining to the Contractor's activities conducted in its PMN, PMS and CFC contract areas. This was followed by the questions and answers session guided by the questionnaires. Questions that would require more response time were sent to the Contractor after the inspection and the Contractor has responded to them in due time.

19. A tour of KIOST facilities at its headquarters in Busan was organised by the Contractor. In addition, a half-day fieldtrip was organised on 2 October 2024 to visit the South Sea Research Institute (a branch of KIOST located on Geoje Island) where all KIOST's geological and biological samples collected during exploration campaigns are preserved and stored.

20. Reference was made to the KIOST website during the preparation of this report to acquire relevant information and confirm some of the information provided by the Contractor. The Contractor was given the opportunity to review the inspection report before it was finalised. All references and resources used in this inspection are listed in Annex I of this report. A copy of the inspection schedule is in Annex 3 of this report.

IV. Information Review

21. During the inspection, the Contractor provided relevant information on its strategic approach and relationship with KIOST and other partners, including information that are specific to each of the three contracts. The summary of presentations and subsequent discussions are provided below.

4.1 Organisational Setting

22. In accordance with the three contracts signed with ISA, the Contractor through MOF is responsible for implementing these three contracts (i.e. PMN, PMS and CFC contracts). KIOST is contracted by MOF to carry out its scientific and technical studies including deep-sea mineral exploration activities. KIOST reports to MOF. KIOST aims to guide ROK toward fulfilling its dream of becoming a maritime power by pursuing innovative and creative developments in basic and applied marine science and technology.⁸

23. With MOF oversight, KIOST carries out all activities identified under the PMN, PMS and CFC contracts. Resource exploration activities are carried out by the Ocean Georesources Research Department (OGRD) whilst environmental-related deep-sea minerals research and exploration are shared between the Marine Biotechnology and the Bioresource Research Department (MBBRD) and the Marine Environment Research Department (MERD).

24. The Contractor confirmed that deep-sea minerals development is part of MOF's strategic plan and long-term goals to secure strategic metals. However, the Contractor explained that its transition from exploration to exploitation will depend on several factors including, the adoption of the exploitation regulations for seabed minerals in the Area, global and local economic conditions, the price of metals, and the growing opposition to deep-sea minerals development.

4.2 Capacity and competence of key personnel

25. With 30 years of experience in deep-sea minerals research, prospecting and exploration, KIOST has accumulated significant number of experts in different fields that are responsible for managing the three contracts and implementing its annual activities. Approximately 100 professionals from each field (i.e. marine geology, deep-sea biology and environmental science, and legal) are involved in KIOST's deep-sea mineral exploration. This includes both internal staff from various departments as well as external collaborators from academic institutions, research organizations, and governmental agencies.

26. KIOST submitted the curriculum vitae of four of its leading experts in deep-sea minerals research and exploration. All these experts are PhD holders with 25 – 34 years of research and exploration experience in geology, deep-sea minerals and/or related fields. Additionally, they have significant publications that demonstrate their vast knowledge and experience in various deep-sea minerals related topics. The Contractor further provided information on its fleet of five research vessels, highlighting its technical resources in support of its deep seabed related activities. The vessels, equipped with technologies designed for research and exploration, were presented as integral to the Contractor's operational strategy.

27. Each of the three contracts is managed by a KIOST project manager, and exploration activities are carried out by relevant experts such as marine geologists, deep-sea biologists and environmentalists. Most of them are employed full-time by KIOST while others are either on short-term contracts or part-time employment.

⁸ https://kiost.ac.kr/eng/sub01_02.do

4.3 Funding

28. KIOST is fully funded by the Korea Institute of Marine Science and Technology (KIMST) through MOF, including funding allocation to carry out the Contractor's PMN, PMS and CFC exploration activities. MOF is the contracting party when the funding agreement is signed with KIMST. According to KIOST, the funding provided by MOF for its deep-sea mineral exploration activities varies annually and this determines the activities that need to be prioritised in a year.

4.4 Current and future partnerships

29. As highlighted above, KIOST is the only agency entity contracted by the Contractor to implement its PMN, PMS and CFC plans of work for exploration. KIOST had previously collaborated with the Korea Research Institute of Ships and Ocean Engineering (KRISO) on mining technology development and is actively engaged with the same entity in the development of exploration equipment. Similarly, KIOST had worked with the Korea Institute of Geoscience and Minerals Resources (KIGAM) on PMN smelting. Further, KIOST is collaborating with 10 universities in ROK in deep-sea minerals research and innovation.

4.5 Management systems, policies and procedures

30. The Contractor confirmed that the relevant policy and law related to risk management are available on the KIOST website. Special emphasis is placed on ensuring the safety of persons and the protection of the marine environment during exploration activities. The Safety and Health Section of KIOST is responsible for matters relating to (i) disaster management, (ii) general safety management, (iii) management of occupational safety and health, (iv) prevention and management of serious accidents, and (v) other tasks related to safety and health.

4.6 Relevant national legal instruments

31. KIOST's Ocean Law and Policy Institute is responsible for analysing ISA rules, regulations and procedures and the development of relevant domestic policies and laws. The Contractor confirmed that national policies, legislation and regulations on deep-sea minerals management have already been developed and submitted to Congress for their consideration. The Contractor is confident that these legal instruments will be endorsed and enacted soon. The Contractor follows ISA exploration regulations in managing and administering its PMN, PMS and CFC contract activities.

32. The Contractor referenced the MARPOL Convention as the framework for managing environmental risks associated with its activities. In addition, the Contractor emphasised that all exploration activities are conducted in accordance with KIOST's SOPs, and risk and incident management are carried out according to KIOST's health and safety guidelines.

33. With respect to the protection of the marine environment, the Contractor implements comprehensive risk management measures to protect the marine environment through various laws and regulations, including the Marine Science Investigation Act, Ship Safety Act, Seafarers Act, and Maritime Safety Act, alongside adherence to international conventions. These frameworks

incorporate Environmental Impact Assessments for major activities, pollution prevention and control measures (such as ballast water management and waste disposal), emergency response protocols for incidents like oil spills, and robust monitoring and enforcement to ensure compliance. Collectively, these efforts aim to minimize the environmental impact of marine activities and safeguard marine ecosystems.

4.7 PMN Contract

34. The last exploration cruise in the Contractor's contract area was carried out in 2021, and none was conducted in 2022 and 2023. There is no plan to carry out any exploration cruise in the current five-year contract period due to the re-prioritisation of funding to exploration activities in the Contractor's PMS and CFC contract areas. The Contractor will focus primarily on the analyses of geological and biological samples collected from previous PMN exploration cruises.

35. The Contractor confirmed that the analyses of PMN samples collected from the top of the Magellan seamount located within its CFC contract area in 2021 have been reported in its 2023 PMN annual report. This was done for the purpose of scientific interest and to compare the characteristics (i.e. nodule type, mode of formation, metal contents and grades) of these PMN samples with those that were collected from its PMN contract area in the Clarion-Clipperton Zone (CCZ). The Contractor is reminded that pursuant to Regulation 43 of the Regulations⁹, the Contractor is required to notify ISA of its finding if it finds resources other than CFC in its CFC contract area. This will be addressed by the Contractor in future annual reports.

36. Regarding the results of the experiment conducted to understand the effect of addition of ore particles on phytoplankton as described in Chapter IV of the 2023 annual report, the Contractor stated that this experiment was conducted in 2018.

37. In relation to the delay in mining technology upgrade, the Contractor stated it had conducted four separate test mining in its EEZ between 2009 and 2015. The first was conducted in 2009 using the MINERO I and this was followed by the second and third test mining in 2012 and 2013 respectively using the MINERO II. The fourth and last test mining was conducted in 2015 at 1500m – 2000m water depths in which the performance test of the lifting system was completed. Further, the Contractor claimed that its mining prototype is similar to the ones that were recently tested by GSR and NORI hence there is no immediate need for upgrade. The Contractor indicated that its PMN mining technology will be upgraded in due time in which Artificial Intelligence (AI) will be integrated to the system. This new model will be bigger and robust and will be tested in the Contractor's PMN contract area. The Contractor also informed that in 2012 a PMN smelting system, developed in collaboration with KIGAM, was tested.

38. It was noted that the Contractor did not conduct an updated mineral resource estimation in 2023. The Contractor confirmed that the last resource estimation was done in 2021 after the last exploration cruise. An updated resource estimation will be carried out when new resource data and information are available.

⁹ Regulations on Prospecting and Exploration for Cobalt-rich Ferromanganese Crusts in the Area.

39. The Contractor did not carry out any training programme in 2023. In response, the Contractor stated that there was no funding allocated for training in 2023. After discussions with the Capacity Development Unit of the Secretariat, it was eventually agreed that the Contractor will fund and support four trainees in 2024 and another four in 2025.

40. The Contractor's expenditures were 65% less than projected in 2023. The Contractor explained that funding allocation for PMN activities for the current 5-years has been reduced. MOF is directly responsible for PMN funding and due to the re-prioritisation of funding the PMN allocation has been reduced since 2022. The Contractor further added that personnel were utilised across the three contracts and there was no cruise in 2023.

41. The Inspection Team noted a significant deviation from the programme of activities in the current 5 years compared to what had been initially proposed due to the reduction in funding allocation. Similarly, the LTC noted a reduction by 29 percent of the Contractor's expenditure in 2023. The Contractor stated that the prolong development period of draft exploitation regulations for seabed minerals in the Area is impacting its exploration strategy, including the transitioning to the exploitation phase.

42. During the inspection, the Contractor in response to questions on its monitoring mechanism on KIOST's activities, indicated that it has assumed direct oversight of activities pertaining to the PMN contract. This arrangement has been necessitated by a reduction in funding and is intended to ensure optimal resource utilisation.

4.8 PMS Contract

43. The Contractor confirmed that it conducted exploration cruises in its PMS contract area in 2019, 2021, 2023 and the most recent one was completed in April-May 2024. A total of 11 hydrothermal vent fields (i.e. 8 active and 3 inactive vents) were explored during these expeditions. The Contractor had to make appropriate adjustments in ensuring its exploration activities were in alignment with its programme of activities for the last 5-years that ended on 23 June 2024, even though its planned exploration activities were significantly impacted by COVID-19.

44. Concerns were raised by the LTC that the Contractor does not fully comply with the annual reporting template (i.e. ISBA/21/LTC/15, Annex II) including the absence of an annual plan of activities and the actual exploration work completed and on-land analytical programme. The Contractor noted this anomaly and indicated that this will be rectified in the next reporting cycle.

45. The Inspection Team noted from the Contractor's 2023 annual report that it did not submit navigation data (i.e. station location, multibeam and sonar track lines, and ship track), and bathymetry, side scan sonar, video data and near-bottom water parameters collected during its March-April 2023 exploration cruise to the Secretariat. This is consistent with the LTC's view on data submission. In response, the Contractor is committed to verify its data submission records and will submit the data as soon as possible if it has not done so. The Contractor was also reminded that it is responsible for ensuring that all data collected from its contract area are submitted to the Secretariat pursuant to Section 10 of the Standard clauses for exploration contract.

46. The Inspection Team noted that based on the detailed surveys at the 11 known PMS sites including sampling and mapping, the Contractor should have enough data and information to conduct the first mineral resource estimation. However, the Contractor indicated that it intends to carry out additional surveys such as geo-physical, high-resolution bathymetry, magnetic and electromagnetic to attain enough data and information before it carries out a resource estimation on its PMS contract area in 2025. This will also inform the Contractor's second relinquishment that is due on 30 December 2026.

47. With regards to data submission, the Contractor explained that it retains the data for scientific paper publication purposes and will submit them to DeepData once the publication is completed or publicly available. The Inspection Team reminded the Contractor of the content of the obligation set out in ISBA/21/LTC/15, annex II, and underscored that the data should be provided to ISA as soon as possible regardless of the timeline decided by the Contractor to publish them in scientific papers. The Contractor was informed that should they wish to use certain exploration data for publication and/or any other purposes, it must request the Secretariat not to release these data until such time the publication is made public. In response to the clarification provided, the Contractor agreed to comply with the regulations on data submission. However, the Contractor requested that CARMU provides clear guidance on the use of data for publication and/or any other purposes.

48. With regards to population connectivity, the Contractor used *Rimicaris kairei* (a species of hydrothermal shrimp) to understand population connectivity in the vent field. In response to inquiries on the possibility of using other taxa to provide a broader range of taxa with varying reproductive capabilities and ecological traits, the Contractor confirmed that it intends to use other taxa such as mussels and snails for additional population connectivity studies.

49. The Contractor was reminded by the LTC to use readable font sizes and map legends in future reports and provide a map to show clearly the relationship between the overall contract area and the survey area. The Contractor agreed to rectify this in future annual reports.

50. The Contractor was asked to clarify why its actual 2023 expenditure has exceeded its planned expenditure by 33.31%. In response, the Contractor explained that this was mainly due to the exploration cruise conducted in 2023 which offsets the unspent allocations from the previous years.

51. The Inspection Team noted that the Contractor did not provide its exploration strategy in the 2023 annual report. The Contractor confirmed that its exploration strategy was provided in its second 5-year periodic report and it also presented that the following activities will be undertaken in the current 5-year period (i.e. 2024 – 2029): image and sampling survey at and near sulphide deposits, high resolution multibeam bathymetry and magnetometer survey, controlled source electromagnetics (CSEM) survey and resource modelling, understanding mineralization processes of sulphide deposits formed under diverse geological settings, physical oceanographic studies, chemical and geological oceanographic data acquisition for sufficient spatial variation, mapping and sampling of biological communities, and ecotoxicology and natural resilience.

52. On research and development of mining and processing technologies, the Contractor stated that the first 5-year period focused on resources exploration and the second 5-year period was dedicated to detailed resource assessment. It also considered the uncertainties surrounding the timing of commercialization of deep-sea mining that influenced its decision to prioritise exploration activities in the last five years. The Contractor indicated that in the next 5-year period, an evaluation of existing technologies will be undertaken and will be assessed against its own research on PMS technology development.

4.9 CFC Contract

53. The Contractor had carried out five exploration cruises in its CFC contract area in the last three years (i.e. 2021 – 2023). An environment expedition was conducted in 2021 whilst the two surveys conducted in 2022, and the two additional exploration cruises carried out in 2023 were focused on both the CFC resource assessment and environmental studies. While activities were impacted by the COVID-19 pandemic, the Contractor demonstrated that its exploration activities were largely aligned with its programme of activities for the last five years (i.e. 2018-2023) and the current 5-year period (i.e. 2023-2028). Exploration activities conducted in the last three years included high resolution bathymetry, visual surveys, coring, dredging, physico-chemical properties assessment, bio-diversity surveys, and resource estimation using a broad range of survey equipment. The Contractor's programme of activities for the current 5-years were also highlighted.

54. The LTC shared the concern with the Contractor of the latter's inability to comply with the annual reporting template (i.e. ISBA/21/LTC/15, annex III). The Contractor's 2023 annual report has been described by the Inspection Team as severely incomplete due to missing data and information. The Contractor took note of the comment and is committed to provide all the outstanding data and information to CARMU by the end of 2024 or in its 2024 annual report. The Contractor was urged to submit all data and information to the Secretariat during the next annual reporting cycle.

55. The Contractor's attention was drawn by the LTC to the fact that it needed to provide an overview of its sampling programme, as required under ISBA/21/LTC/15, annex III, for the exploration cruises carried out in August-September and December 2023. The Contractor took note of this request and indicated that it will provide the necessary information in its 2024 annual report, whilst also indicating that it will rectify this issue in its future annual reports.

56. It was brought to the Contractor's attention that despite the reporting of station activities, no map had been provided in its 2023 annual report in which to verify the level of completeness of its annual plan of activities. The Contractor has confirmed that this will be addressed in the 2024 annual report.

57. The Contractor expressed concerns regarding significant delays with reviews of its 5-year periodic review report that was submitted to CARMU in early 2023. CARMU took note of these concerns and assured the Contractor that measures were well underway to streamline the review process to ensure the review of all the 5-year periodic review reports are completed within a reasonable timeframe.

58. With reference to the first mineral resource estimation in which a wide range of results was obtained when different CFC classification criteria were used, the Contractor was invited by the Inspection Team to provide clarity on how its future strategy on refining and validating its resource definition to inferred and indicated resource categories. In response, the Contractor explained that it intends to carry out additional resource assessment activities including drilling in 2025 – 2028 to increase geological knowledge and confidence from which resource estimation will be refined and updated over the next four years. This ongoing resource assessment will also inform the Contractor's first relinquishment scheduled to be submitted in March 2026.

59. In relation to the sampling on seamounts KC-7, KC8 and KC-9 in which 63 core samples were collected, the Contractor confirmed that the KIOST Remotely Operated Coring System (KROCS) was used to collect these samples. This ROV mounted drilling equipment is designed to collect CFC samples with a diameter of approximately 6 cm. In accordance with ISBA/25/LTC/6/Rev.3, sections VI(A)(32) and VI(B)(33), this activity does not require the Contractor to submit an Environmental Impact Statement (EIS).

60. Clarification was sought by the LTC that the Contractor is not planning for any mining test in its programme of activities. The Contractor clarified that it would concentrate on carrying out resources assessment and environmental studies in the current 5-year period (i.e. 2023-2028) to increase geological knowledge and confidence and to better understand the deep-sea environment and the likely impacts of mining. Additionally, technology development and mining test will be considered in the third 5-year period (i.e. 2028-2033).

61. The Contractor was reminded by the LTC to ensure that the data collected on benthic diversity are accurate. For example, in one part of the 2023 annual report it was noted that there were 103 benthic species collected (interpreted as 44 echinoderms, 3 polychaetes and 56 crustacea). However, looking at the numbers in later lines, a total of 206 species (95 echinoderms, 12 polychaetes, 80 crustaceans and 9 species of molluscs) was collected. In response, the Contractor clarified that the 103 species were collected during the 2023 KIOST survey and the 206 species may have included the species collected during previous marine scientific research.

62. The Inspection Team also informed the Contractor that its 2024 annual plan of activities were regarded as too general. It lacks any plan for how much sampling will be undertaken, or where or how to ensure that gaps in the environmental baseline are filled. The Contractor is advised to address this issue in future annual reports by providing the necessary details in relation to its annual plan of activities for the following year. The Contractor took note of this point and confirmed that it will provide a detailed response to CARMU by the end of 2024.

63. The Contractor's attention was drawn by the LTC to the fact that it had consistently failed to provide in its 2021, 2022 and 2023 annual reports relevant information in several parts and specifically under results of exploration work in accordance with ISBA/21/LTC/15, Annex III. Such information included navigation data, survey methods, obtained data, and interpretations and assessments. The Contractor is committed to rectifying this shortfall in future annual reports.

V. Observations and recommendations

5.1 General

64. Based on the information provided by the Contractor and the review of the annual reports by the LTC and the Inspection Team, it is verified that the Contractor has a sound organisational setting with clear demarcation of responsibilities and reporting lines with its technical subcontractor, KIOST. The Contractor provides the overall oversight for the management of exploration activities whilst KIOST is responsible for carrying out all exploration activities and reporting to MOF on a regular basis. KIOST is fully funded by KIMST through MOF.

65. While the Contractor has confirmed that deep-sea minerals development is part of its long-term development strategy, the transition from exploration to exploitation will largely depend on when the draft exploitation regulations for seabed minerals in the Area will be adopted and come into effect, the global and local economic conditions, and the price of metals.

66. With respect to human capacity and competence, KIOST has accumulated significant knowledge, technologies and other resources over 30 years of experience in deep-sea minerals research, prospecting and exploration. Additionally, KIOST has many experts who have been trained in specialised fields within broader areas of study such as geology, deep-sea biology, oceanography and ocean policy and law. Under the guidance of the Contractor, these experts are responsible for implementing the Contractor's annual plan of activities and fulfilling its contractual obligations.

67. In terms of collaboration and partnerships, apart from internal cooperation within KIOST, KIOST has collaborated with KRISO on the development of mining technology and exploration equipment, as well as with KIGAM on PMN smelting. Further, KIOST is collaborating with 10 universities in ROK in deep-sea minerals research and innovation.

68. The Contractor has confirmed that it gives utmost priority in ensuring the safety of its staff and the protection of the marine environment during exploration activities. All its exploration activities are guided by relevant national policies, laws and regulations pertaining to risk and environmental management.

69. In relation to national policy and legislation, the Contractor has confirmed that its deep-sea minerals management policy and legislation have been submitted to Congress for consideration. The Contractor follows the ISA exploration regulations to manage and administer its PMN, PMS and CFC contract activities. The Contractor has emphasised that all exploration activities are conducted in accordance with its SOPs, and risk and incident management are carried out according to its health and safety guidelines.

5.2 PMN Contract

70. Based on the Inspection Team's review of the information provided by the Contractor and the discussion that took place during the inspection it has been confirmed that the Contractor does not plan to carry out any exploration cruise in the current five-year period (i.e. 2021-2026) due to

the re-prioritisation of funding towards PMS and CFC exploration activities. The Contractor is therefore reminded to implement its programme of activities for the current 5-year period including quantifying the PMN reserves and selecting a minable area within its contract area by April 2026.

71. The Contractor has confirmed that the analyses of PMN samples collected from the top of the Magellan seamount located within its CFC contract area in 2021 are reported in its 2023 PMN annual report. The Inspection Team noted that such finding is subject to notification to ISA by the Contractor pursuant to Regulation 43 of the Regulations. Accordingly, the Contractor has been advised to report any PMN samples discovered in its CFC contract area to ISA, and to report the PMN analysis results in its CFC annual report.

72. In relation to test mining, the Contractor has confirmed that, apart from the Contractor's test mining conducted between 2009 and 2015, there is no urgent need to upgrade its mining technology. However, as soon as the decision to transition to exploitation is made, the Contractor will upgrade its PMN mining technology integrating Artificial Intelligence (AI) into the system. The Contractor is encouraged to develop and submit a plan to upgrade its mining technology for the next 5-10 years including the PMN smelting system.

73. Regarding the reduction in funding allocation for PMN activities for the current 5-years, the Inspection Team has prompted the Contractor to commit to achieving the objectives of its second 5-year contract extension, which are to: (i) quantify the reserves of the polymetallic nodules using deep-towed side scan sonar and deep-sea video camera and the selection of a mineable area within the contract area, and (ii) understand physical, chemical, and biological properties of the contract area, both in the pelagic and benthic environment in line with the recommendations contained in the document ISBA/25/LTC/6/Rev.3.¹⁰

74. The Inspection Team recalled that the LTC has identified the impact of the lack of adoption of the draft exploitation regulations for seabed minerals in the Area as irrelevant to alter the execution of contractual obligations. The Contractor is therefore reminded to continue implementing its agreed programme of activities in accordance with relevant ISA rules, regulations and procedures.

5.3 PMS Contract

75. The Contractor demonstrated progress in implementing its programme of activities for the last five years (i.e. 2019-2024), including the completion of four exploration cruises in which 11 hydrothermal vent fields were explored. Notably, the Contractor had effectively made the necessary adjustments to its exploration activities to align with its programme of activities for the last 5-years despite the significant challenges encountered during the COVID-19 pandemic period.

76. In relation to annual reporting, the Contractor is reminded by the Inspection Team to follow the annual reporting template (i.e. ISBA/21/LTC/15, annex II). It must report all its exploration activities carried out in a year in the next reporting cycle. The Contractor has agreed to rectify this anomaly in the 2025 reporting cycle.

¹⁰ Recommendations for the guidance of contractors for assessment of the possible environmental impacts arising from exploration for marine minerals in the Area.

77. The Contractor is requested by the Inspection Team to ensure that all data collected but not yet submitted from its contract area is submitted as soon as possible to CARMU pursuant to Section 10 of the Standard clauses for exploration contract. The use of certain exploration data for publication and/or any other purposes, should be preconditioned to a request submitted to the Secretariat not to release the data until such time the publication is made public. The Contractor has taken note of this requirement and agreed to submit its PMS data accordingly.

78. The justification provided by the Contractor regarding the significant increase in its 2023 expenditure is noted.

79. While the Contractor presented its programme of activities for the next 5 years (i.e. 2024 – 2029), its attention is drawn to the provision of its future strategy for exploration work in the annual report as indicated in the Recommendations for the guidance of contractors on the content, format and structure of annual reports (ISBA/21/LTC/15, Annex II, Section III, paragraph 7).

80. Regarding the development of mining and processing technologies, the Contractor is encouraged to prepare and submit its technology development status and plan in its next annual report.

5.4 CFC Contract

81. The Contractor's effort in conducting five exploration cruises in the last three years (i.e. 2021 – 2023), despite the challenges associated with the COVID-19 pandemic, is acknowledged by the Inspection Team. As highlighted during its presentation, the Contractor has carried out significant exploration activities during the last five exploration cruises. It is also confirmed that its exploration activities are aligned with its programme of activities for the last five years (i.e. 2018-2023) and the current 5-year period.

82. In relation to annual reporting, the Contractor's attention is drawn to its obligation to comply with the annual reporting template (i.e. ISBA/21/LTC/15, annex III) and the fact that in the last three years, relevant information in several parts under the result of exploration work were missing. Further, the Contractor is requested to provide all the missing / outstanding data and information including navigation data, survey methods, obtained data, and interpretations and assessments in its 2024 annual report in accordance with the reporting template. Taking note of the shortfall in its reporting, the Contractor has agreed to rectifying this issue in its 2024 annual report and future annual reports. Further, the Contractor is committed to submit the exploration data collected in December 2023 in its 2024 annual report.

83. The Contractor is reminded that part of its reporting obligation is to provide an overview of its sampling programme, as required under ISBA/21/LTC/15, Annex III, Section III, paragraph 4(b) for the two exploration cruises carried out in 2023. The Contractor took note of this issue and indicated that this will be corrected in its future annual reports.

84. Regarding the reporting of station activities without any map provided in the annual report to verify the completeness of annual plan of activities, the Contractor is reminded that it must

provide both the map of the activity plan and the map showing the actual level of completion of the activity. The Contractor has agreed to address this in the 2024 annual report.

85. With respect to the review of the Contractor's 5-year periodic review report, CARMU is committed to streamlining the review process to ensure all the 5-year periodic reports are reviewed and finalised within a reasonable timeframe.

86. With reference to the wide range of mineral resource estimation results obtained, the Contractor explained that it intends to carry out additional resource assessment activities including drilling in 2025 – 2028 to increase geological knowledge and confidence. Reference is made to ISBA/21/LTC/15, Annex III, Section III, paragraph 6(b) as guidance for the refinement of its resource estimation on an annual basis and inclusion in its annual report.

87. With regards to mining test, the Contractor has indicated that it will consider technology development and mining test in its third 5-year period (i.e. 2028-2033). The Contractor is requested to provide its technology development and mining test plans in the next annual report.

88. In relation to the commentary on the accuracy of benthic diversity data reported in the annual report, the Contractor is requested to avoid this type of data reporting ambiguity. The Contractor needs to separate and explain the benthic diversity data that were collected in 2023 from those that were collect previously in the annual report.

89. The Contractor's attention is drawn to the general nature of its annual plan of activities and the apparent lack of relevant details in some aspects of its activities. The Contractor is requested to adjust its approach and ensure that all the necessary details on the implementation of its annual activities and its annual plan of activities for the following year are provided to the Secretariat. The Contractor has taken note of this and is committed to provide a detailed response to CARMU by the end of 2024.

VI. Way Forward

90. The Secretariat will monitor the implementation of measures outlined in Section V above to ensure that the points raised are addressed in a timely manner.

Annex I – References and resources

The lists of references and resources that are used for the ROK inspection are provided below:

- **ISA Secretariat**
 - ISA Inspection Notification Letter to the Contractor (Annex 2)
 - Secretary General's letter regarding ROK Annual Report Letter to ROK (Annex 3)
 - Inspection Schedule for the ROK inspection
- **Republic of Korea**
 - ROK PMN, PMS and CFC annual reports
 - ROK PMN, PMS and CFC 5-year periodic review reports
 - Curriculum vitae of four KIOST team leaders
 - Presentation 1 – General points relevant to the scope of inspection
 - Presentation 2 – Overview of PMN contract activities
 - Presentation 3 – Overview of PMS contract activities
 - Presentation 4 – Overview of CFC contract activities
 - KIOST website – <https://www.kiost.ac.kr/eng.do>

Annex 2 – Inspection notification letters

A. Notification letter for PMN contract



Reference: PMN/03.5/2001/KOR

Dear Ms. Kang,

I wish to refer to the contract for the exploration for polymetallic nodules between Government of the Republic of Korea and the International Seabed Authority (ISA) that was signed on 27 April 2001 and extended on 27 April 2016 and 27 April 2021 [Ref #: PMN/03/2001/KOR].

Under article 153(4) of the United Nations Convention on the Law of the Sea (UNCLOS), ISA is required to exercise such control over activities in the Area that is necessary for the purpose of securing compliance with the relevant provisions of Part XI of UNCLOS and the rules, regulations and procedures of ISA, as well as the approved plans of work for exploration. Consistent with the Decision of the Council of 11 November 2023 (ISBA/28/C/27), the Secretary-General is to report to the Council on an annual basis in respect of alleged instances of non-compliance. Accordingly, the Secretariat is required to monitor Contractor's compliance with its plans of work.

The responsibilities of the Secretary-General in relation to monitoring compliance with plans of work for exploration, as set out in UNCLOS, the 1994 Agreement, the regulations, and the standard clauses for exploration contracts, include inspecting vessels and installations (Standard Clauses 14.2 and 14.3), and providing relevant information to the Contractor and sponsoring State(s) arising from the inspection reports (Standard Clause 14.7). The operational unit of the Secretariat that is responsible for the implementation of the Secretary-General's responsibilities with respect to monitoring and reporting on the activities of Contractors is the Compliance Assurance and Regulatory Management Unit (CARMU).

In due time, the Council will be required to establish an appropriate inspection mechanism pursuant to article 162(2)(z) of UNCLOS. Although such an inspection mechanism does not exist at present, it is expected that the establishment thereof will be addressed in the context of the exploitation regulations.

Following on the preliminary discussions held by CARMU on 15 July 2024 with Dr Se-Jong-Ju (Senior Director of Marine Resources & Environment Research Division, Korea Institute of Ocean Science and Technology (KIOST)), Dr Youngtak Ko (Director, Georesources Research Department, KIOST), Dr Sun Ki Choi (Senior Research Scientist, KIOST), Dr Inkyeong Moon (Senior Research Scientist, KIOST), and Dr Jaewoo Jung (Senior Research Scientist, KIOST), and the email confirmation received from Dr Jaewoo Jung on 27 August 2024, the Secretariat wishes to formally notify the Government of the Republic of Korea of its intention to conduct an in-person inspection meeting on 26 September 2024.

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This inspection will mainly focus on the Government of the Republic of Korea's implementation of its plans of work in the last three years, reporting of activities from another ROK contract area, technology development, mineral resources estimation, annual reporting and other areas deemed necessary by the Secretariat. A copy of the inspection plan will be shared in due course.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Michael W. Lodge", is positioned below the "Yours sincerely," text.

Michael W. Lodge

B. Notification letter for PMS contract



Reference: PMS/03.5/2014/KOR

Dear Ms. Kang,

I wish to refer to the contract for the exploration for polymetallic sulphides between Government of the Republic of Korea and the International Seabed Authority (ISA) that was signed on 24 June 2014 [Ref #: PMS/03/2014/KOR].

Under article 153(4) of the United Nations Convention on the Law of the Sea (UNCLOS), ISA is required to exercise such control over activities in the Area that is necessary for the purpose of securing compliance with the relevant provisions of Part XI of UNCLOS and the rules, regulations and procedures of ISA, as well as the approved plans of work for exploration. Consistent with the Decision of the Council of 11 November 2023 (ISBA/28/C/27), the Secretary-General is to report to the Council on an annual basis in respect of alleged instances of non-compliance. Accordingly, the Secretariat is required to monitor Contractor's compliance with its plans of work.

The responsibilities of the Secretary-General in relation to monitoring compliance with plans of work for exploration, as set out in UNCLOS, the 1994 Agreement, the regulations, and the standard clauses for exploration contracts, include inspecting vessels and installations (Standard Clauses 14.2 and 14.3), and providing relevant information to the Contractor and sponsoring State(s) arising from the inspection reports (Standard Clause 14.7). The operational unit of the Secretariat that is responsible for the implementation of the Secretary-General's responsibilities with respect to monitoring and reporting on the activities of Contractors is the Compliance Assurance and Regulatory Management Unit (CARMU).

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This inspection will mainly focus on the Government of the Republic of Korea's implementation of its plans of work in the last four years, on-land exploration activities, data reporting and submission, future exploration strategy, technology development, annual reporting and other areas deemed necessary by the Secretariat. A copy of the inspection plan will be shared with you in due course.

Yours sincerely,

A handwritten signature in black ink, which appears to read "Michael W. Lodge". The signature is written in a cursive, flowing style.

Michael W. Lodge

C. Notification letter for CFC contract



Reference: CFC/05.5/2018/KOR

Dear Ms. Kang,

I wish to refer to the contract for the exploration for cobalt-rich ferromanganese crusts between the Government of the Republic of Korea and the International Seabed Authority (ISA) that was signed on 27 March 2018 [Ref #: CFC/05/2018/KOR].

Under article 153(4) of the United Nations Convention on the Law of the Sea (UNCLOS), ISA is required to exercise such control over activities in the Area that is necessary for the purpose of securing compliance with the relevant provisions of Part XI of UNCLOS and the rules, regulations and procedures of ISA, as well as the approved plans of work for exploration. Consistent with the Decision of the Council of 11 November 2023 (ISBA/28/C/27), the Secretary-General is to report to the Council on an annual basis in respect of alleged instances of non-compliance. Accordingly, the Secretariat is required to monitor Contractor's compliance with its plans of work.

The responsibilities of the Secretary-General in relation to monitoring compliance with plans of work for exploration, as set out in UNCLOS, the 1994 Agreement, the regulations, and the standard clauses for exploration contracts, include inspecting vessels and installations (Standard Clauses 14.2 and 14.3), and providing relevant information to the Contractor and sponsoring State(s) arising from the inspection reports (Standard Clause 14.7). The operational unit of the Secretariat that is responsible for the implementation of the Secretary-General's responsibilities with respect to monitoring and reporting on the activities of Contractors is the Compliance Assurance and Regulatory Management Unit (CARMU).

In due time, the Council will be required to establish an appropriate inspection mechanism pursuant to article 162(2)(z) of UNCLOS. Although such an inspection mechanism does not exist at present, it is expected that the establishment thereof will be addressed in the context of the exploitation regulations.

Following on the preliminary discussions held by CARMU on 15 July 2024 with Dr Se-Jong-Ju (Senior Director of Marine Resources & Environment Research Division, Korea Institute of Ocean Science and Technology (KIOST)), Dr Youngtak Ko (Director, Georesources Research Department, KIOST), Dr Sun Ki Choi (Senior Research Scientist, KIOST), Dr Inkyeong Moon (Senior Research Scientist, KIOST), and Dr Jaewoo Jung (Senior Research Scientist, KIOST), and the email confirmation received from Dr Jaewoo Jung on 27 August 2024, the Secretariat wishes to formally notify the Government of the Republic of Korea of its intention to conduct an in-person inspection meeting on 26 September 2024.

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This inspection will mainly focus on the Government of the Republic of Korea's implementation of its plans of work in the last five years, sampling programme, quantity of samples recovered, data submission and reporting, resource assessment, future exploration strategy, and incomplete annual reporting and other areas deemed necessary by the Secretariat. A copy of the inspection plan will be shared with you in due course.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Michael W. Lodge".

Michael W. Lodge

Annex 3 – Inspection Schedule

The inspection meeting was conducted on 26 September 2024 at 9.30 – 6.00pm ROK Time at the KIOST headquarters in Busan, ROK. The inspection schedule is provided below.

Time	Agenda item	Responsibility
9.30 - 9.40 am	<ul style="list-style-type: none"> Welcome and introduction. 	<ul style="list-style-type: none"> Inspection Team and MOF-KIOST
9.40 - 10.00 am	<ul style="list-style-type: none"> Inspection background, objectives, and scope 	<ul style="list-style-type: none"> Inspection Team
10.00 - 11.20 am	<ul style="list-style-type: none"> Video on the introduction of KIOST Presentation relevant with the scope of inspection (Organisation Structure, Health & Safety Plan, EMMP, Inspection plan, etc) Presentation on the overview of PMN, PMS, & CFC contract activities by ROK-MOF-KIOST Q & A. 	<ul style="list-style-type: none"> MOF-KIOST
11.20 - 11.40 am	<ul style="list-style-type: none"> Tea Break 	
11.40 - 12.30 pm	<ul style="list-style-type: none"> Interviews on Inspection scope: <ul style="list-style-type: none"> General questions Specific questions related to ROK PMN contract, ROK PMS contract, and ROK CFC contract 	<ul style="list-style-type: none"> Inspection Team and MOF-KIOST
12.30 - 2.00 pm	<ul style="list-style-type: none"> Lunch 	
2.00-3.00 pm	<ul style="list-style-type: none"> Interviews on Inspection scope (cont.): <ul style="list-style-type: none"> General questions Specific questions related to ROK PMN contract, ROK PMS contract, and ROK CFC contract 	<ul style="list-style-type: none"> Inspection Team and MOF-KIOST
3.00 - 4.00 pm	<ul style="list-style-type: none"> Tour of KIOST facilities (Korea Ocean Satellite Centre, Hydrodynamic Testing) 	<ul style="list-style-type: none"> MOF-KIOST
4.00 – 5.50 pm	<ul style="list-style-type: none"> Interviews on Inspection scope (cont.): <ul style="list-style-type: none"> General questions Specific questions related to ROK PMN contract, ROK PMS contract, ROK CFC contract 	<ul style="list-style-type: none"> Inspection Team and MOF-KIOST
5.50 – 6.00 pm	<ul style="list-style-type: none"> Next steps Closing 	<ul style="list-style-type: none"> Inspection Team