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Draft regulations for exploitation of mineral resources in the Area

Development of environmentally responsible mining technologies: towards an approval process for mining equipment

Submitted by the delegation of the Netherlands

I. Introduction

1. The exploitation of polymetallic nodules in the Area is approaching and a regulatory framework is under development. In July 2011, the Council of the International Seabed Authority requested the secretariat to prepare a strategic workplan for the formulation of regulations for the exploitation of deep-sea minerals in the Area.

2. Pursuant to the decision of the Council, the secretariat of the Authority prepared a strategic workplan for the formulation of such regulations (see ISBA/18/C/4). In 2013, the Legal and Technical Commission began its consideration of the issues relating to the proposed regulations for the exploitation of polymetallic nodules in the Area (ISBA/19/C/14).

3. At its twenty-second session in July 2016, the Council welcomed the Commission's work on the framework for the exploitation regulations, in particular the first working draft of the regulations, and requested the Commission to continue that work as a matter of priority (ISBA/22/C/28).

II. Reason for submitting

4. Current available technologies for the mining of minerals are expected to exert different pressures on the ecosystem that may lead to various types of environmental impacts on the marine ecosystem. Future technological developments are needed to reduce such impacts. One question that arises in this context concerns how mining activities and the use of equipment to conduct exploitation will be assessed in relation to their impact on the marine environment. Such assessment is

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necessary to minimize harm to the marine environment with the goal of protecting and preserving the marine environment.

5. Adaptive management as part of best environmental practices means that uncertainties are expected to be reduced over time through a “learning by doing” process. The use of an adaptive management approach could facilitate the application of future technological developments.

III. Objective

6. The application of an assessment methodology for equipment, operational procedures and processes used in deep sea mining exploitation activities is considered supportive of the adaptive management approach. A proposal for the development of such an assessment methodology and a subsequent approval process is outlined in the annex hereto.

IV. Recommendations

7. The Council is invited to take into account the above-mentioned points when considering the proposal outlined in the annex.

8. The Council is also invited to request the Commission to consider:

(a) The development of an assessment methodology for equipment, operational procedures and processes used in deep sea mining exploitation activities;

(b) The development of an approval process to ensure that equipment, operational procedures and processes used for exploitation activities meet requirements that are yet to be established for avoiding or minimizing adverse environmental impacts.

Annex

Development of an assessment methodology and subsequent approval process for environmentally responsible mining technology

I. Introduction: legal context

1. The legal framework with respect to the development of environmentally responsible mining technologies currently includes the following:

(a) The United Nations Convention on the Law of the Sea, which includes the following provisions:

(i) The obligation for States parties to take necessary measures with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects that may arise from such activities, to which end the Authority shall adopt appropriate rules, regulations and procedures (art. 145);

(ii) That measures taken by States to prevent, reduce and control pollution of the marine environment shall deal with all sources of pollution of the marine environment (art. 194 (3));

(iii) The objective criteria that should be reflected in the rules, regulations and procedures to be adopted by the Authority with respect to the protection of the marine environment (annex III, article 17 (2) (f));

(b) The Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, in particular section 1, paragraph 5 of the annex thereto, which sets out several focus areas related to the protection and preservation of the marine environment that the Authority needs to concentrate on before approving the first plan of work for exploitation;

(c) The Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area, as amended (ISBA/19/C/17, annex), which provide, inter alia:

(i) That the Authority and sponsoring States shall apply a precautionary approach as well as best environmental practices to ensure the effective protection of the marine environment (Part V, regulation 31, para. 2);

(ii) That the contractor is required to carry out impact assessments and environmental monitoring, in order to determine the effect of exploration activities on the marine environment, and is also required to submit data and information to the Authority, upon expiration of the contract, regarding equipment used to carry out exploration work, including the results of tests conducted on proposed mining technologies (see annex IV, sects. 5 and 11);

(d) The recommendations for the guidance of contractors for the assessment of the possible impacts arising from exploration for marine minerals in the Area, issued by the Legal and Technical Commission (ISBA/19/LTC/8).

2. The above-mentioned Regulations on Prospecting and Exploration also contain various provisions that refer to the technical capability and the technical qualifications of the applicant and/or contractor, as well as to the role of the Authority in assessing that capability (see ISBA/19/C/17, annex IV, section 11). In addition, during the exploration phase, the contractor has the obligation to complete

the necessary preparatory work before being able to proceed to the exploitation stage (see ISBA/21/C/19).

II. Environmental concerns

3. Polymetallic nodules are likely to be the first mineral sources to be exploited from the Area. The nodules typically occur on the abyssal plains of ocean areas, with slow recovery. Although deposit fluxes of organic matter from the productive zone to the sea floor are very low, the layer of sediment at the abyssal plains can be thousands of metres deep. The top layer is porous, therefore very loose, and easily disturbed. Since food levels are limited, the biomass of the sediment-inhabiting fauna is low. However, biodiversity is usually high, with some species probably widely distributed and others restricted to single locations only.[1]

4. The main environmental impacts at and in the surroundings of mining operations concern the disturbance of substrate, the operational plume and resedimentation, and the discharge plume and its effects on pelagic and/or benthic fauna depending on the depth of discharge.[2]

5. Concerns in relation to the social and environmental impacts resulting from the exploitation of deep-sea minerals may hamper further development of the sector. Care should therefore be taken to avoid environmental impacts or reduce them to an acceptable level.

6. There are, as of yet, no internationally approved and applied standards available for exploitation activities or for the environmental impact assessments carried out in relation to those activities.

7. Equipment and processes envisaged to be applied to the exploitation of polymetallic nodules include a mining tool operating on the sea floor and a vertical transport system to transport the material collected to the sea surface.[3] Once the collected material reaches the surface, the ore is separated aboard a mining platform or vessel for transport to shore and the remaining water and tailings are returned to the sea floor.

8. During prospecting and exploration for marine minerals, environmental assessments are performed and reported on annually to the Secretary-General of the Authority. In addition to such environmental assessments, all other relevant information submitted by contractors could be used as a starting point for developing and defining best practices for assessing the environmental impacts of exploitation activities.

[1] Craig Smith, “Habitats and biodiversity in manganese nodule regions,” in *Deep sea minerals*, vol. 1B, *Manganese nodules, a physical, biological, environmental, and technical review*, Elaine Baker and Yannick Beaudoin, eds. (Pacific Community, 2013).

[2] See Ecorys and others, “Study to investigate state of knowledge of deep sea mining: final report, annex 6, environmental analysis (FWC MARE/2012/06-SC E1/2013/04)”, report prepared for the Directorate-General for Maritime Affairs and Fisheries of the European Union (Rotterdam, Netherlands, 28 August 2014). Available from https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/Annex%206%20Environmental%20analysis.pdf.

[3] See www.bluemining.eu/inside.

9. A sample summary of some pressures arising from currently available excavation equipment is provided in table 1.[4] The pressures indicated therein can be useful for the development of environmental assessments.[5]

Table 1.
Inventory of possible environmental pressures resulting from the excavation process

	Excavation action		
Type of environmental pressure	*Moving the tool*	*Collecting nodules*	*Suction material*
Smothering		✓	
Substrate loss		✓	
Changes in siltation (sediment concentration)		✓	✓
Abrasion	✓		
Underwater noise	✓	✓	✓
Thermal regime change		✓	✓
Selective extraction of species			✓
Barrier to species movement	✓	✓	
Changes in pH		✓	✓
Light	✓		
Vibration	✓	✓	

III. Governance through adaptive management

10. Adaptive management as part of best environmental practices means that uncertainties are intended to be reduced over time through a “learning by doing” process.

11. State-of-the-art exploitation practices for polymetallic nodules may not prevent harm to the marine environment. Technical innovations will be required to reduce potential impacts. In order to promote environmentally sound and sustainable development by minimizing the environmental impact in vulnerable ecosystems, environmental aspects should be taken into account at a very early stage, in particular during the development of technology for deep-sea mining operations and during the preparation of such operations.

[4] Institute for Marine Resources and Ecosystem Studies, and others, “Towards zero impact of deep sea offshore projects: an assessment framework for future environmental studies of deep sea and offshore mining”, final report prepared for a project co-funded by the Maritime Innovation Programme of the Netherlands Ministry of Economic Affairs, Agriculture and Innovation and coordinated by Cees van Rhee of Delft University of Technology, submitted 4 April 2014. Available from www.epa.govt.nz/eez/EEZ000006/EEZ000006_05_03_Towards_Zero_Impact_of_Deep_Sea_Offshore_Projects_Final_Report.pdf.

[5] See, for example, Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

12. A process that takes environmental considerations into account during the design phase, alongside technical, economic and regulatory considerations, may generate new sustainable technologies that would make costly mitigation measures redundant.

13. Optimal methods and design cannot be defined without operational experience, namely, learning by doing. The adaptive management approach should provide enough time and resources to allow for the rational development of environmental readiness levels, operational and technical standards and an assessment method and associated procedures.

14. Adaptive management can be put into practice through the monitoring and assessment of exploitation activities in the Area. Both the Authority and the contractor should be able to fulfil such monitoring and assessment through the annual reporting requirements. When new information on technological development becomes available, a review and modification of the plan of work can be agreed upon between the Secretary-General and the contractor. In the short term, this may entail applying mitigation measures to address adverse environmental impacts resulting from exploitation activities. In the long term, this may entail the use of new innovative technologies to further reduce the impacts on the marine environment from exploitation activities.

IV. Technology and environmental readiness levels

15. Technologies being developed for the extraction of deposits depend on the type of deposit, the geomorphological setting, the physical conditions and the scale of the operation.

16. Technology readiness levels, various definitions of which exist for different fields of application, can be used to characterize the maturity of technologies. The method is used to estimate the maturity of critical technology elements of a programme during the acquisition process. The readiness level of a given technology is assessed by means of a technology readiness assessment, in which its maturity is given a score ranging from 1 to 9, where 9 indicates that it is fully operational. Table 2 provides an example of such a system.[6]

Table 2
Sample definition of technology readiness levels

Technology readiness level	*Definition*
1	Basic principles observed
2	Technology concept formulated
3	Experimental proof of concept
4	Technology validated in laboratory
5	Technology validated in relevant environment
6	Technology demonstrated in relevant environment

[6] See the general annexes to the European Commission *Horizon 2020 work programme for 2016-2017*. Available from http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html#h2020-work-programmes-2016-17.

Technology readiness level	*Definition*
7	System prototype demonstrated in operational environment
8	System completed and qualified
9	Actual system proven in operational environment

17. The maturity of evolved technologies, such as devices, materials, components, software and work processes, can thus be rated according to their readiness level.

18. Alongside technology readiness levels, a system for defining environmental readiness levels could be developed to assess how well a piece of equipment, an operational procedure or a process meets the requirements for avoiding or minimizing adverse environmental impacts. Such an assessment system could make use of the criteria or principles supported by the Authority.

19. The application of an adaptive management approach could help to incorporate and implement such criteria or principles as best practical means, best practicable environmental option and best available technology.[7]

20. Adaptive management can also help to incorporate and implement the elements of the template developed at the Authority's workshop on environmental management needs for the exploration and exploitation of deep-sea minerals. The template represents a generalized framework for an environmental impact statement.[8] The goal of such a process would be to assist in the development and, as appropriate, the improvement of environmental readiness levels.

V. Approval process

21. The purpose of an approval process is to ensure that the equipment, operational procedures and processes used for exploitation activities meet relevant requirements for avoiding or minimizing adverse environmental impacts. Such requirements should also provide for the application of technology and environmental readiness levels as described above.

22. One method used internationally to regulate technical requirements for products and equipment involves the use of a private system of standardization and conformity assessment. Combining public regulation with the use of such a private system has various benefits. It offers a way for governments to take advantage of the knowledge available in the private sector, while protecting public interests at the same time. Using the private system in this way makes it possible to ensure that private parties take due responsibility for their activities.

23. Standardization refers to the development of private standards with the involvement of all parties concerned. The International Organization for Standardization and the International Electrotechnical Commission are standardization bodies whose international standards represent a consensus of participating entities on a solution to a particular issue. They provide requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are safe to use and fit for their purpose. The process for developing a standard is based on the core principles of

[7] Best practical means may also be referred to as BPM, best practicable environmental option as BPEO and best available technology as BAT.

[8] International Seabed Authority technical study No. 10.

openness, transparency, effectiveness, relevance, stakeholder engagement and consensus. The inclusion of those principles ensures that such standards can also be used to support public policy.

24. Conformity assessment refers to the process of assessing whether a certain product and/or operation meets the requirements set out in a standard. If an independent third party performs this assessment, it is called third-party conformity assessment. Such third parties are organized as conformity assessment bodies, which are usually private companies that perform assessments at the request of a paying client. In the case of exploitation activities, the client could be any of the following: an applicant applying for a plan of work, a producer, an operator and/or a mining company. The most relevant forms of conformity assessments in relation to products and equipment are inspection and certification.

25. Inspections are performed on a single product or piece of equipment and its operational procedures or on a batch of a certain product or type of equipment and result in an inspection report.

26. Certification goes beyond that and results in a declaration stating that it is justifiable that future products should also meet the requirements of the conformity assessment. The declaration, issued in the form of a certificate, is valid for a certain period of time and, during that period, the certification body performs regular surveillance audits.

27. Conformity assessment bodies may request accreditation for a certain activity, such as the certification and inspection of certain products.

28. Accreditation means that the conformity assessment body has been assessed by an accreditation body. If the conformity assessment body meets the requirements of certain standards of the International Organization for Standardization, it can be granted accreditation, which means that it is considered independent and competent for that specific activity. Accreditation raises the level of confidence in the declaration, such as a certificate, issued by a conformity assessment body. At the international level, there are two organizations that provide accreditation: the International Accreditation Forum, for the accreditation of conformity assessment bodies that perform certifications, and the International Laboratory Accreditation Cooperation, for those that perform inspections.

VI. Use of the system for evaluating types of mining equipment and their operational procedures

29. The system of standardization and conformity assessment could be used to evaluate types of mining equipment and their operational procedures to ensure that environmental aspects are adequately taken into account. Such a system could be part of the approval process for mining activities. One of the requirements for a plan of work could be that only mining equipment having obtained a declaration of conformity from an accredited conformity assessment body could be used. Such a body would assess and confirm if operation of the equipment would meet the maximum impact parameters according to guidelines and rules developed through both laboratory and field experience. Such a system would have to provide for a clear allocation of private and public functions and responsibilities. More specifically, it would need to provide for the following:

(a) With respect to legal requirements and standards:

(i) The Authority would need to adopt rules, regulations and procedures setting out the general requirements that mining equipment and operational

procedures would need to meet before they could be used in exploitation activities;

(ii) The private sector would then be responsible for developing technical standards that would meet the more general requirements established by those rules, regulations and procedures;

(iii) The process of developing standards could be done by an international standardization body, such as the International Organization for Standardization, based on the core principles mentioned above (see para. 23), to ensure that different interests are taken into account when developing the standards;

(iv) The Authority should check whether any existing standards could already meet the general requirements or could form a basis for the development of new standards;

(v) Before approving the standards for adoption and thus for use as standards of reference, the Authority should check whether they meet the general requirements for mining equipment and their operational procedures;

(b) With respect to conformity assessments:

(i) A declaration of conformity from a conformity assessment body should be part of the procedure by which the Authority and, in particular, the Legal and Technical Commission, would consider applications for the approval of plans of work for exploitation;

(ii) It would be the responsibility of the contractor to hire and pay a conformity assessment body to perform a conformity assessment;

(iii) Only competent and impartial conformity assessment bodies, designated by the Authority, should perform the conformity assessment;

(iv) To ensure that conformity assessment bodies are (and will remain) competent and impartial, the Authority should base a designation on valid accreditation from an accreditation body;

(v) Only accreditations from members of the International Accreditation Forum and/or the International Laboratory Accreditation Cooperation should be used, since those bodies follow the international standard established by the International Organization for Standardization and therefore meet the internationally recognized requirements for accreditation;

(c) With respect to oversight and enforcement:

(i) When a conformity assessment body is found to be no longer competent, the Authority should have the power to withdraw, suspend or restrict its designation;

(ii) The Authority should have sufficient resources to check whether the contractor meets the requirements of the plan of work;

(iii) The granting of a declaration of conformity to a contractor for mining equipment and its operational procedure would mean that the equipment is presumed to comply with the requirements set out in a standard.