

Comments by the Environmental Subcommittee of the Strategic Steering Committee of the International Marine Minerals Society (IMMS) on the draft Regulatory Framework for Mineral Exploitation in the Area

1. An opening paragraph introducing you and / or your organization and your direct and / or indirect interest in activities in the Area (Please note for those stakeholders who responded to the Authority's initial Stakeholder Survey, this is not required).

The Environmental Subcommittee of the Strategic Steering Committee of the IMMS is a collection of professionals interested in the prudent and environmentally responsible development of marine minerals. Our commitment is to be the definitive source of environmental science-based intelligence, promoted in a manner that will create win-win opportunities for all stakeholders that is dedicated to responsible environmental management and protection of the oceans. Our members seek to adhere to the IMMS 'Code of Environmental Management of Marine Mining' and will hold each other accountable in our underwater mining projects while promoting transparency in our environmental practices and projects. We see the advantages in gaining a social license from all impacted stakeholders, for this is the only way to gain trust and acceptance. In a world where demand for minerals is increasing and the sources of these minerals are rapidly diminishing, we see the solution to this problem lying in the world's oceans. The comments presented here, represent a collection of viewpoints by the members of the Environmental Subcommittee of the Strategic Steering Committee of the IMMS.

2. Your comments and / or suggestions referenced to the relevant part of this Report.

Page	Section	ISA Statement	Comment
8	Form of applications	Options available to the Authority: (1) to request separate plans of work for exploitation where there are "material" differences between "exploitation areas" and / or (2) to request separate documents (Feasibility study, Environmental impact statement (EIS) and Environmental management plan (EMP)) for each exploitation area (as ultimately defined).	Potential confounding issues. Our group advocate an ecosystem-based approach ¹ through Feasibility-EIS-EMP phases. This approach would recognize a mosaic of seabed biotopes within an exploitation area and environmental assessment and spatial management that suitably addresses that within-area complexity. Also generates potential practical issues where exploitation areas are bordered by exploration areas and where such exploration areas progressively phase into exploitation over large contiguous areas within a tenement.
11	Data and information to be submitted for approval of the plan of work for exploitation	iii. Environmental management plan (EMP);	Lessons recently learned highlight the importance of not only supplying an EMP but demonstrating what the adaptive management responses are and a company's capacity to enact them. Would highlight the considerable challenges associated with linking monitoring outcomes with trigger

¹ See suggested definitions of "ecosystem-based approach" and "adaptive management" in item 3 below.

			<p>values/threshold responses with meaningful adaptive management measures that are financed.</p> <p>Suggest the EMP for approvals is conceptual as at EIS stage a detailed EMP would be difficult to achieve with any real degree of accuracy. Suggest that as a condition of approval that a detailed EMP is provided to the authority say 3 to 6 months prior to mining commencing, which is a more realistic timeframe.</p>
		iv. Social impact assessment / statement and action plan (this may be integrated into the EIS above);	Recommend SIA be incorporated into the EIS rather than be a stand-alone document. It is always more efficient to do this, particularly as the SIA will be small for any mining in a given Area.
		vi. Closure plan;	Closure plan at the EIS submission stage should be conceptual only. It will not be possible to provide a detailed closure plan so early in the project life cycle.
11	Feasibility Study	To be prepared in accordance with good mining industry practice and based on sound engineering and economic principles and accompanied by a report of an independent expert(s), including mining engineer.	<p>Suggest that good mining practice be defined as consistent with existing Committee for Mineral Reserves International Reporting Standards member standards, such as the Canadian NI43-101.</p> <p>There is no mention of environmental viability in the Feasibility Study. Environmental impact considerations are fundamental to any feasibility study included in the above standards. Considering recent scientific directions and uptake by industry, suggest that early identification of environmental sensitivities, identification of Ecologically or Biologically Significant Marine Areas (EBSAs), potential spatial management objectives, etc., would be included here.</p>
12	EIS	An EIS must be: i. Based on the Environmental impact assessment (EIA) and on “sound engineering and economic principles” and good mining industry practice and verified by an independent environmental consulting firm.	Review by suitably qualified and experienced reviewers if and when appropriate, informed by the nature of questions raised in the EIS, which may or may not involve a consulting firm. There is a need to build in a certain level of independent review, where appropriate. Ideally, this independence, and thus legitimacy, would be automatically built into a world class EIS via the selection of world class specialists whose work will stand up to

			scrutiny. Question is whether regulators/stakeholders perceive that to be the case.
		The concept of an “Environmental Impact Area” may need to be developed to cover areas beyond the exploitation area(s), horizontally and vertically (and cumulative impacts) where significant impacts may occur.	Suggest detail needed to understand how this all works spatially in the context of the operator (a lease area). This is relevant to the definition of “material difference” in exploitation areas potentially requiring separate assessments and potential interactions between exploitation and contiguous exploration areas within a lease.
13	EMP	An EMP must be / include: i. Based on the EIS and on “sound engineering and economic principles” and good mining industry practice (including IFC Performance Standards 1 and 614 and other relevant internationally recognized standards ¹⁵) and verified by an independent environmental consulting firm.	As above.
		Subject to inspection regime and frequent (say, every 2 years?) independent audit.	The monitoring data or the monitoring plan to be subject to inspection? Would suggest that the data should be subject to inspection at every monitoring round. This should also include independent monitors stationed on the mining and processing vessels as well.
		Preparation (and delivery) to reflect Best environmental practice (BEP) and application of the precautionary approach.	Best practice language coming in now at the EMP phase, but could be reflected above through Feasibility and EIS too.
24	Conservation of the natural resources of the Area	Visibility of processing and treatment of the ore should be stipulated.	What is meant by “visibility of processing”? Is this referring to visual impacts? If so, impacts to whom? Or are they referring to commercial transparency?
31	Restoration and rehabilitation of the marine environment		Restoration is unlikely to be a practical or successful activity for nodules for example. Restoration should be considered, but it should not necessarily be a requirement. Need to be very careful proponents aren't required to restore seafloor to a pre-mining (or acceptable) state which may be impossible to achieve.
43	9. Effective protection for the marine environment from harmful effects	It is recognised that the Authority and other actors should adopt an ecosystem-based approach to environmental management in the Area. Additionally, it is recognised that specific criteria and guidance must be	Supportive of this statement. Reflects current best practice. Suggest that these principles could propagate throughout in above sections.

		<p>developed for concepts such as “significant adverse change” and “vulnerable marine ecosystems”; to this end the Authority can draw upon existing best practice definitions and work already in progress across the stakeholder base.</p>	
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3. Any other general and / or specific comments you wish to make on the development of the regulatory framework.

General Comments

The Regulatory Framework for Mineral Exploitation in the Area document adequately sets the scene well for what the framework will end up looking like and covers the key themes. This document was critically analyzed from the point of view of how this would work in practice – a lease overlying a mosaic of seabed biotopes, overlain by a patchwork of sequential or parallel exploitation areas that may be contiguous with exploration areas. There is some terminology in the framework that would need tightening. Mention of the possibility for multiple applications based on "material differences" raises some concern. It is unclear at this time how that interacts with later mention of "Environmental Impact Areas", and how that fits in with ideas of spatial management of exploration-exploitation within a lease.

Considering the EIS process, a Terms of Reference (ToR) should be developed at the start of the EIS process. The ToR would at a high level describe the project, mining method, potential impacts and proposed EIS studies. This would be submitted to the authority for discussion/modification/endorsement. This will ensure that everyone understands what studies will be conducted for the EIS (including social). This should remove/minimize the chance of the authority asking for additional studies that may require long study times at great expense. This would also resolve the ambiguities in some of the regulations e.g., the need to monitor currents over the whole water column - does this mean 12 months over the whole water column (equipment costs up to \$500k), or something more realistic based on actual impacts? In other words, let's understand the EIS study requirements at the start so no nasty surprises occur. There needs to be a mechanism to keep confidential information that may be necessary for an EIS confidential. We see reference to confidential information in the framework, but are unclear if this actually relates to the EIS or other applications.

In what concerns the environmental bonds and trust funds, etc, we suggest that it may warrant an expert workshop including industry, the Authority, and NGO representation. If the bond is to cover accidental events, then industry would probably argue the appropriate insurances are best placed to deal with this. If it is to cover the cost of closure commitments, then perhaps the bond could be paid in instalments throughout the mine life rather than all up front, noting that closure activities will likely occur some 20 years after the commencement of exploitation.

Ecosystem Approach and Adaptive Management

State parties to the United Nations Convention on Biological Diversity (CBD), which include the vast majority of the State sponsors of exploration Contractors in the Area, have concluded that a key mechanism for implementation of the Convention is the application of an “ecosystem approach” to environmental management. The ecosystem approach is defined by a specific set of “Guidelines and Principles” that were

recommended by the CBD's Subsidiary Body on Scientific, Technical and Technological Advice² and adopted by the Conference of the Parties³.

In general, these principles and guidelines promote the comprehensive management of natural resources in a way that places explicit value on biological diversity and the unconstrained functioning of ecosystems when evaluating proposals for changes in uses within the Area. It requires knowledge about and the protection of the key relationships and processes of ecosystem functioning. It seeks participation by all stakeholders in management decision-making.

Of particular interest here, the ecosystem approach specifically promotes the use of adaptive management as a key part of the approach. Principle 9, (which explains the justification for adaptive management) and Guideline 3 (which defines what is meant by the term) are reproduced below in their entirety:

Principle 9: Ecosystems change, including species composition and population abundance. Hence, management should adapt to the changes. Apart from their inherent dynamics of change, ecosystems are beset by a complex of uncertainties and potential "surprises" in the human, biological and environmental realms. Traditional disturbance regimes may be important for ecosystem structure and functioning, and may need to be maintained or restored. The ecosystem approach must utilize adaptive management in order to anticipate and cater for such changes and events and should be cautious in making any decision that may foreclose options, but, at the same time, consider mitigating actions to cope with long-term changes such as climate change [underline added].

Guideline 3. Use adaptive management practices.

Ecosystem processes and functions are complex and variable. Their level of uncertainty is increased by the interaction with social constructs, which need to be better understood. Therefore, ecosystem management must involve a learning process, which helps to adapt methodologies and practices to the ways in which these systems are being managed and monitored. Implementation programmes should be designed to adjust to the unexpected, rather than to act on the basis of a belief in certainties. Ecosystem management needs to recognize the diversity of social and cultural factors affecting natural-resource use. Similarly, there is a need for flexibility in policy-making and implementation. Long-term, inflexible decisions are likely to be inadequate or even destructive. Ecosystem management should be envisaged as a long-term experiment that builds on its results as it progresses. This "learning-by-doing" will also serve as an important source of information to gain knowledge of how best to monitor the results of management and evaluate whether established goals are being attained. In this respect, it would be desirable to establish or strengthen capacities of Parties for monitoring.

The regulatory implications of this "learning-by-doing" approach are of course potentially very threatening to the development of a stable and predictable regime for commercial recovery. It will be key for the success of the developing regulatory regime that adaptive management be formulated in a way that also provides the level of predictability that is essential in order to attract the large investments required for such ventures.

² SBSTTA (Subsidiary Body on Scientific, Technical and Technological Advice). 2000. SBSTTA 5 Recommendation V/10, Ecosystem approach: further conceptual elaboration. URL:

<http://www.cbd.int/recommendation/sbstta/default.shtml?id=7027>

³ COP (Conference of the Parties to the Convention on Biological Diversity). 2000. Ecosystem Approach, COP 5 Decision V/6. URL: <http://www.cbd.int/decision/cop/default.shtml?id=7148>

In 2011 the ISA Council issued a decision⁴ directing the ISA Secretariat to employ an environmental management plan with the characteristics recommended at the same session (Session 17, 2011) by the LTC⁵. One of the goals listed in the LTC plan is the following:

(b) Contribute to the achievement of the management goals and targets set forth in the Plan of Implementation of the World Summit on Sustainable Development, including: halting the loss of biodiversity; establishing ecosystem approaches to management; and developing marine protected areas, in accordance with international law and based on the best scientific information available, including representative networks by 2012. [underline added]

The LTC plan cites the Convention on Biological Diversity several times in its description of the plan's scientific design, and there is no doubt that the ecosystem approach referenced here is the same as that defined by the CBD. Thus, the ecosystem approach seeks knowledge of and places value on biological diversity and ecosystem functioning for specific inclusion in environmental management. These components of the ecosystem approach are central to the planned implementation of baseline data collection, application of the Precautionary Approach, and the establishment of Marine Protected Areas. The ecosystem approach also calls for adaptive management to be employed as a primary management tool. The term "adaptive management" was proposed by C.S. Holling⁶ as a new way to complete environmental impact assessment and management. Stringer et al.⁷ define it as follows:

Adaptive management is a methodological approach that views policies as if they were experiments to be studied, such that the results from one generation of study inform subsequent decisions.

The general practice is currently implemented by several government agencies.^{8,9,10}

Suggested Implementation by the ISA

The Canadian Environmental Assessment Agency (CEAA) formulation of adaptive management¹¹ may be a good model for the ISA implementation of adaptive management; this is because it is clearly stated, reasonably balanced, and incorporated explicitly into the process of environmental impact assessment.

Its implementation by the ISA could be included first in the environmental impact assessment to be completed prior to commercial recovery prototype testing and then refined in the final impact assessment required for long-term commercial recovery. Major aspects of this formulation that are relevant to polymetallic nodule commercial recovery include:

⁴ ISA (International Seabed Authority). 2011. *Decision of the Council of the International Seabed Authority relating to an environmental management plan for the Clarion-Clipperton Zone*, ISBA/17/C/19, URL:

<http://www.isa.org.jm/files/documents/EN/17Sess/Council/ISBA-17C-19.pdf>

⁵ ISA (International Seabed Authority). 2011c. *Environmental Management Plan for the Clarion-Clipperton Zone*, ISBA/17/LTC/7. URL: <http://www.isa.org.jm/files/documents/EN/17Sess/LTC/ISBA-17LTC-7.pdf>

⁶ Holling, C.S. 1978. *Adaptive Environmental Assessment and Management*. John Wiley & Son, Chichester.

⁷ Stringer, L.C., A.J. Dougill, E. Fraser, K. Hubacek, C. Prell, and M.S. Reed. 2006. Unpacking "Participation" in the Adaptive Management of Social-ecological Systems: a Critical Review, *Ecology and Society* 11(2):39, 22 p. URL: <http://www.ecologyandsociety.org/vol11/iss2/art39/>

⁸ DEFRA (Department for Environment, Food and Rural Affairs, United Kingdom). 2009. *Adapting to Climate Change: helping key sectors to adapt to climate change: Statutory Guidance to Reporting Authorities*, 38 p. URL: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/182610/Adapting-to-Climate-Change-helping-key-sectors-to-adapt-to-climate-change.pdf

⁹ Michanek, G. and A. Christiernsson. 2013. *Adaptive Management of EU Marine Ecosystems - About Time to Include Fishery*, Uppsala Faculty of Law Working Paper 2013:5. URL: <http://www.jur.uu.se/LinkClick.aspx?fileticket=czYhUrXqvXk%3D&tabid=5502&language=sv-SE>

¹⁰ DOI (Department of the Interior, United States). 2012. *Adaptive Management: The U.S. Department of the Interior Applications Guide, Adaptive Management Working Group*, U.S. Department of the Interior, Washington, DC. 136 p. URL: <http://www.doi.gov/initiatives/AdaptiveManagement/TechGuide.pdf>

¹¹ CEAA (Canadian Environmental Assessment Agency). 2013. *Adaptive Management Measures under the Canadian Environmental Assessment Act*, URL: <http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=50139251-1>

- The specific options considered for mitigation of impacts by recovery operations are clearly defined in the impact assessment;
- These mitigation measures are technically and economically feasible and will be effective; and
- The monitoring measurements to be used to evaluate which option is best are clearly defined with thresholds for action specified.

Possible Example of Adaptive Management

It is currently unclear what the optimal discharge depth is of the excess water and fine materials that will be generated in the nodule pick-up operation. One method is to discharge directly into surface waters. This would create a plume of sediment-laden water but would also inject nutrients and solid substrate into the otherwise almost barren oligotrophic ocean waters. Alternately, the discharge could be piped all the way back to the nodule pickup site where it would increase temperature at depth and add to the suspended sediments disturbed by the pickup operations.

Operators would know in advance that it might be necessary to install a discharge system that would minimize as much as possible potentially negative environmental impacts. This would allow them to be able to return the dewatering discharges to the ocean floor and they would need to plan for this alternative. However, there would be a period of time, probably some years, during which the impacts of the surface discharge would be monitored, including the potential effects on surface species and benthic life, with agreed-upon and well defined thresholds of impact that would trigger the modification of the operation.

4. A list of any supporting documents accompanying your submission, together with website links where applicable.

Barbier, E. B., Moreno-Mateos, D., Rogers, A. D., Aronson, J., Pendleton, L., Danovaro, R., Henry, L.-A., Morato, T., Ardron, J., and Van Dover, C. L. (2014). Ecology: Protect the deep sea. *Nature* 505, 475–477. <http://dx.doi.org/10.1038/505475a>.

CEAA (Canadian Environmental Assessment Agency). 2013. Adaptive Management Measures under the Canadian Environmental Assessment Act. <http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=50139251-1>

COP (Conference of the Parties to the Convention on Biological Diversity). 2000. Ecosystem Approach, COP 5 Decision V/6. <http://www.cbd.int/decision/cop/default.shtml?id=7148>

DEFRA (Department for Environment, Food and Rural Affairs, United Kingdom). 2009. Adapting to Climate Change: helping key sectors to adapt to climate change: Statutory Guidance to Reporting Authorities, 38 p. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/182610/Adapting-to-Climate-Change-helping-key-sectors-to-adapt-to-climate-change.pdf

DOI (Department of the Interior, United States). 2012. Adaptive Management: The U.S. Department of the Interior Applications Guide, Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC. 136 p. <http://www.doi.gov/initiatives/AdaptiveManagement/TechGuide.pdf>

Holling, C.S. 1978. Adaptive Environmental Assessment and Management. John Wiley & Son, Chichester.

ISA (International Seabed Authority). 2011. Decision of the Council of the International Seabed Authority relating to an environmental management plan for the Clarion-Clipperton Zone, ISBA/17/C/19. <http://www.isa.org.jm/files/documents/EN/17Sess/Council/ISBA-17C-19.pdf>

ISA (International Seabed Authority). 2011. Environmental Management Plan for the Clarion-Clipperton Zone, ISBA/17/LTC/7. URL: <http://www.isa.org.jm/files/documents/EN/17Sess/LTC/ISBA-17LTC-7.pdf>

Michanek, G. and A. Christiernsson. 2013. Adaptive Management of EU Marine Ecosystems - About Time to Include Fishery, Uppsala Faculty of Law Working Paper 2013:5. <http://www.jur.uu.se/LinkClick.aspx?fileticket=czYhUrXqvXk%3D&tabid=5502&language=sv-SE>

Nakajima, R., Yamamoto, H., Kawagucci, S., Takaya, Y., Nozaki, T., Chen, C., Fujikura, K., Miwa, T., and Takai, K. (2015). Post-Drilling Changes in Seabed Landscape and Megabenthos in a Deep-Sea Hydrothermal System, the Iheya North Field, Okinawa Trough. PLoS ONE 10, e0123095.

<http://dx.doi.org/10.1371/journal.pone.0123095>.

Link to video: https://www.youtube.com/watch?v=djLBbe17OPU&feature=em-share_video_user

SBSTTA (Subsidiary Body on Scientific, Technical and Technological Advice). 2000. SBSTTA 5 Recommendation V/10, Ecosystem approach: further conceptual elaboration.

<http://www.cbd.int/recommendation/sbstta/default.shtml?id=7027>

Stringer, L.C., A.J. Dougill, E. Fraser, K. Hubacek, C. Prell, and M.S. Reed. 2006. Unpacking “Participation” in the Adaptive Management of Social–ecological Systems: a Critical Review, Ecology and Society 11(2):39, 22 p. <http://www.ecologyandsociety.org/vol11/iss2/art39/>

Van Dover, C., Aronson, J., Pendleton, L., Smith, S., Arnaud-Haond, S., Moreno-Mateos, D., Barbier, E., Billett, D., Bowers, K., Danovaro, R., Edwards, A., Kellert, S., Morato, T., Pollard, E., Rogers, A. and Warner, R. (2014). Ecological restoration in the deep sea: Desiderata. Marine Policy 44:98-106.

<http://dx.doi.org/10.1016/j.marpol.2013.07.006>.

5. Your express consent (see below) to make your personal details and submission publicly available (note: the Authority may also reference your comments against specific Sections and parts of the framework for ease of reading by all stakeholders).

The Environmental Subcommittee of the Strategic Steering Committee of the IMMS authorizes that its details and submission comments are publicly available.

6. Your interest in future contact by the Authority and / or being part of a stakeholder group (except for those stakeholders who have already expressed such an interest).

The Environmental Subcommittee of the Strategic Steering Committee of the IMMS is interested in future contact by the Authority and in being part of a stakeholder group.

7. Your contact details clearly identified.

Environmental subcommittee of the Strategic Steering Committee of the International Marine Minerals Society (IMMS).

Contacts of the co-chairs (on behalf of the environmental subcommittee members):

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