

**The International Marine Minerals Society  
Code for Environmental Management of Marine Mining**

**Summary of Presentation to and Comments from  
the Legal and Technical Commission and Members of  
the International Seabed Authority  
at the 16<sup>th</sup> Session of the ISA  
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**I. Presentation**

**A. Introduction**

The presenter expressed her appreciation to the International Seabed Authority (ISA) on behalf of the IMMS for the invitation to present the Code to the Legal and Technical Commission (LTC) and the Members of the ISA to discuss its further development with the distinguished Members. She also voiced her pleasure at returning to Jamaica, which she had first visited in 1974, when the Law of the Sea Convention (LOSC) was in the first stages of negotiation. The conclusion of this "*Constitution for the Oceans*", as it was memorably described by H.E. Tommy T.B. Koh of Singapore, President of the Third United Nations Conference on the Law of the Sea, on the occasion of the LOSC's opening for signature at Montego Bay in 1982, culminated in the founding of the ISA and its hosting by Jamaica.

The Members were introduced to Document ISBA/16/LTC/2, which presents the full revised draft revision of the International Marine Minerals Society's (IMMS) Code for Environmental Management of Marine Mining (Code), a brief overview of its concept and structure, and the background of the IMMS. This document is available in the six official United Nations languages on the ISA website ([www.isa.org.jm](http://www.isa.org.jm)) and on the IMMS website ([www.immsoc.org](http://www.immsoc.org)). The information contained in Document ISBA/16/LTC/2 was briefly summarized (not reprised here).

As the revision of the Code nears completion, the work of the ISA on environmental regulations for prospecting and exploration for nodules, crusts and massive sulphides is either complete or nearly so, and the Recommendations for Nodules are undergoing their first revision (document ISBA/16/LTC/CRP.1), the ISA Secretariat considered that it would be useful for the IMMS to formally present the draft revised IMMS Code to the 16<sup>th</sup> meeting of the Legal and Technical Commission (LTC) and the Members of the ISA for detailed scrutiny and to request input from both distinguished bodies towards the Code's further improvement before its final draft is submitted to the IMMS membership for formal adoption. This will assist in ensuring that the Code remains complementary to and consistent with the ISA's work when the ISA begins to address exploitation. To facilitate the discussion, the presenter placed marine mining in its industrial and legal context and adopted a comparative approach to the IMMS Code and the ISA Regulations.

## **B. Marine Mining - An Emerging Industry**

By contrast with already fully established industries, marine mining of deep-sea non-fuel minerals is not hampered by time-worn ways of doing business and long-fixed, often conflicting, vested interests that are difficult to reconcile, let alone redirect, in order to comply with modern environmental and commercial requirements. Environmental issues are a major source of risk inherent in any industrial activity, both to the environment and to the industry itself.

The industry members of the IMMS - and it is important to recall that the Code, and its current revision, are an **industry** initiative - decided that the Code must address the environmental aspects of the whole mining cycle, continuing to exploitation and going beyond it to finishing the mining activity and rehabilitating the site. The Code envisages environmental planning as commencing well before mining begins and continuing after mining ends with environmental restoration and monitoring. To achieve this comprehensive objective, the drafters of the Code drew, *inter alia*, on industry experience with in- and near-shore marine mining, early test activities for nodule and crust mining, and, in the current draft revision of the Code, with recent preparations for mining polymetallic sulphides, as well as the work of the ISA on environmental regulation of nodule, crust and sulphide prospecting and exploration.

The work of the ISA and the IMMS on the environmental aspects of marine mining offers a unique occasion to get it right *ab initio*, and in particular to prevent environmental problems rather than trying to fix them after they have occurred. Repair is always far more expensive than prevention, and where environmental damage is concerned, repair is usually not very effective, even in the unlikely event that funds to do so are available. From their separate but complementary vantage points, the ISA and the IMMS are able to seize this promising opportunity to put in place a comprehensive framework for the environmentally and commercially responsible development of this emerging industry, which, like all industries, requires regulatory predictability and minimization of risk in environmental matters, to facilitate financial and operational planning and implementation. This framework would inform the full cycle of an industrial activity: from prospecting to exploitation to decommissioning and rehabilitation.

## **C. International Law**

The ISA is specifically charged by the LOSC and its Part XI Implementing Agreement to ensure that marine mining in the Area is environmentally responsible. This is an implementation of the **unqualified** "*obligation*" the LOSC places on States "*to protect and preserve the marine environment*" (LOSC Art. 192). This obligation is now considered by most commentators to be a rule of customary international law and applicable to all States, including non-parties to the LOSC. Hence States are required to ensure that marine mining in areas under their jurisdiction and control (e.g., the Exclusive Economic Zone, the continental shelf and the territorial sea) and by legal or natural persons under their jurisdiction and control on the high seas (the seabed underneath is under the jurisdiction of the ISA, as noted above) are environmentally responsible. The Code assists in achieving these requirements.

## **D. Need for the Code**

The Code is necessary because so little national environmental regulation of marine mining exists, especially beyond the territorial sea, and almost none in Areas Beyond National Jurisdiction (ABNJ), except for the work of the ISA in the Area. In this context, promulgation and standardization of environmental regulations between national jurisdictions, the ABNJ, and the Area are essential. When states address environmental aspects of marine mining in their individual jurisdictions, the IMMS hopes that they will base their regulations on the work of the ISA and the IMMS, and thus continue the development of a consistent and level playing field for at least these aspects of marine mining.

It is also in the industry's and the host mining State's interest to ensure that marine mining is operated on a level environmental playing field vis-à-vis other mining host States, to avoid destructive competition between States to set the lowest common denominator for environmental protection in order to attract the industry and to avoid placing environmentally responsible mining companies at a competitive disadvantage with less environmentally responsible ones. The long-standing flag-of-convenience issue confronting international shipping offers a cautionary example of the environmental and safety consequences where interjurisdictionally consistent regulations are not in place. In this respect the current environmental regulatory lacuna for marine mining offers a significant advantage: regulations can more easily be developed to be consistent across multiple jurisdictions. Hence the IMMS and the ISA are observing each other's work with interest, because of the opportunity to achieve interjurisdictional consistency for environmental regulation of marine mining.

## **E. Comparison of the ISA Regulations and the IMMS Code**

### **1. Overview**

#### **a. Scope**

The ISA currently concentrates on prospecting and exploration, because actual mining in the Area (defined in LOSC Article 1(1).(1) as: "*the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction*") is not, on current projections, imminent. It could eventually be necessary, when the ISA begins work on Regulations to govern exploitation, that the ISA expand the definition of that activity to include decommissioning and environmental rehabilitation, as the Code does.

#### **b. Applicability**

The LOSC limits the ISA's geographic jurisdiction to the Area. The Code, although voluntary, is or can be applicable everywhere. Both the ISA and the Code have the same subject-matter jurisdiction, defined in LOSC Article 133 (a) as: "*all solid, liquid or gaseous marine mineral resources in situ at or beneath the seabed*". Therefore all marine minerals are covered, including methane hydrates - this latter point was made in answer to a question on that specific resource from a Member.

#### **c. Approach**

The IMMS Code and the ISA's Regulations and Recommendations differ crucially in that the Code does not prescribe specific practices. It sets broad directions in

the context of shared values. This is why, in response to a question from a Member, the IMMS is able to present a single Code to cover all marine mining and all marine mineral resources, at least so far. By contrast, the ISA has been obliged to develop a separate set of regulations for each of the three resources (nodules, crusts and sulphides) it has addressed so far, although the three sets overlap substantially.

These shared values are reflected in the Code's six Environmental Principles and ten Operating Guidelines. The ten Guidelines go into considerable detail. Finding the golden mean between specificity and abstraction has been a major challenge in revising the Code, especially at Guideline level, and particularly in light of the detailed comments received. To ensure that none of the richness of that input is lost and can benefit the drafting of specific regulations in due course, the IMMS plans to place all comments, anonymized, on the IMMS website.

## **2. Illustrative Examples**

To illustrate how IMMS and ISA could benefit from their interaction the draft revised Code and the ISA's Nodule, (draft) Crust and (draft) Sulphide Regulations were compared with the following four specific examples.

### **i. Precautionary Principle**

The ISA Regulations refer to Rio Principle 15. The draft revised Code uses a different definition. Rio Principle 15 states: *"In order to protect the environment, the precautionary approach shall be widely applied by States according to capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."*

The draft revised Code states: *"The precautionary principle: the lack of conclusive evidence for a causal relationship between an activity in or an input to the marine environment and the reasonable likelihood that this activity or input may seriously or irreversibly harm the marine environment cannot be used to postpone action to avoid or minimize such potential harm. The proponent of an activity bears the burden of proof that a proposed activity is not harmful."*

The draft revised Code's definition, while still open to debate by the IMMS membership, is preferred to Rio Principle 15, because: 'full scientific certainty' is an oxymoron and not an objective, measurable condition; the Code unambiguously assigns the burden of proof to the proponent of an activity, whereas Rio Principle 15 does not; and the Code does not weaken the application of the precautionary principle by qualifying it according to "capabilities", whereas Rio Principle 15 does.

### **ii. Liability**

The draft revised Code does not at present address liability because this aspect is mostly considered to be outside the scope of the Code. Even those who do not necessarily consider it to be outside the Code's scope were unable to propose a generally applicable formulation. The ISA Nodule Regulation 30, and the draft Crust and Sulphide Regulations 32 & 33, respectively, state that: *"Responsibility and liability of the*

*contractor and of the Authority shall be in accordance with the [LOS] Convention. The contractor shall continue to have responsibility for any damage arising out of wrongful acts in the conduct of its operations, in particular damage to the marine environment, after the completion of the exploration phase."*

### **iii. Confidentiality**

The draft revised Code distinguishes between proprietary and non-proprietary environmental data for confidentiality and does not at present have a sunset clause for the former. The ISA Nodule Regulation 35 makes no such distinction and essentially permits the contractor to invoke confidentiality for data and information as it sees fit, albeit in consultation with the ISA. However, the draft Crust and Sulphide Regulations 38 & 39, respectively, after reprising verbatim the text of ISA Nodule Regulation 35, add: "*Data and information that is [sic] necessary for the formulation by the Authority of rules, regulations and procedures concerning protection and preservation of the marine environment and safety, other than proprietary equipment design data, shall not be deemed confidential.*"

All three sets of ISA Regulations also include a sunset clause for the confidentiality status: "*Ten years after the date of submission of the data and information....or the expiration of the contract for exploration, whichever is later, [they must be reviewed] by the Secretary-General and the contractor, and every five years thereafter, to determine whether they should remain confidential. Such data and information shall remain confidential if the contractor establishes that there would be a substantial risk of serious and unfair economic prejudice if the data and information were to be released.*"(ISA Nodule Regulation 35(3); draft Crust and Sulphide Regulations 38(3) & 39(3).)

### **iv. Archaeological and Historical Objects**

The draft revised Code at present does not include archaeological or historical objects (OAHN), human remains, or OAHN sites within its scope; only cultural values and interests are addressed. The ISA Nodule Regulation 8 states: "*A prospector shall immediately notify the Secretary-General in writing of any finding in the Area of an [OAHN] and its location.*" The draft Crust and Sulphide Regulations 8 both add "*of actual or potential*" after 'object'.

The ISA Nodule Regulation 34 adds: "*Following the finding of any such object of an archaeological or historical nature in the exploration area, the contractor shall take all reasonable measures to avoid disturbing such [sic] object.*"

The draft Crust and Sulphide Regulations 37 & 38 add 'human remains' and 'sites' to the scope of the OAHN provisions for contractors, and also the broaden the scope of the required responses to such discoveries: "*Following the finding of any such human remains, object or site in the exploration area, and in order to avoid disturbing such human remains, object or site, no further prospecting or exploration shall take place, within a reasonable radius, until such time as the Council decides otherwise after taking account of the views of the Director-General of the United Nations Educational,*

*Scientific and Cultural Organization [UNESCO] or any other competent international organization."*

In all cases the Secretary-General of the ISA must notify the Director-General of UNESCO of the find and, in the draft Crust and Sulphide Regulations, any other competent international organization also.

### **3. Conclusions**

In general, the draft revised Code and the draft ISA Crust and Sulphide Regulations are somewhat more complementary than the draft revised Code and the ISA Nodule Regulations. This is not surprising, as the ISA Nodule Regulations were promulgated much earlier, and even so they were already then and still remain far-seeing in their approach to environmentally responsible marine mining. The draft revised Code and the two later sets of Regulations reflect the additional experience, knowledge and insight gained in the intervening period.

Because of their different scope, purpose, and legally binding nature, the three sets of ISA Regulations go into more detail than the draft revised Code. The draft revised Code includes a cross-reference to ISA Guidelines and Recommendations in setting up environmental baseline and monitoring studies. Overall, the draft revised Code and the ISA Regulations demonstrated more similarities than contrasts. This is good evidence of shared values. The draft Crust and Sulphide Regulations are now sufficiently advanced that several of their innovations, such as protection for OAHN and sunset clauses for confidentiality of proprietary environmental data, could be proposed to the IMMS as additional revisions to the Code. This would also enhance the complementarity between the Code and the Regulations.

### **4. Next Steps**

The current draft revised version of the Code has been widely circulated via the internet, and has been formally presented to and comments received from the marine mining community at the 38<sup>th</sup> session of the Underwater Mining Institute (2008) in Oxford, Mississippi and the deep-sea marine scientific research community at the 2009 Woods Hole Oceanographic Institution and InterRidge Science and Policy Workshop on Deep Sea Mining of Seafloor Massive Sulphides, Woods Hole, Massachusetts. It will be presented in May 2010 to the broader marine industrial community at the Offshore Technology Conference in Houston, Texas.

Comments on the draft revised Code are welcome until 31 May 2010 to [verlaan@hawaii.edu](mailto:verlaan@hawaii.edu) (*since extended to 21 June 2010*). The final draft of the revised Code will be available on the IMMS website ([www.immsoc.org](http://www.immsoc.org)) from 31 July 2010. It will be presented to the IMMS for adoption at its Annual General Meeting, to be conducted during the 39<sup>th</sup> session of the Underwater Mining Institute, to be held 4-9 October 2010 in Gelendzhik, Russian Federation.

## **II. Discussion**

A lively discussion in plenary followed both presentations. The questions and comments by the Members and the answers by the presenter are grouped into topics and set out below. The headings encapsulate the questions, some of which addressed the same topic from different angles. The subsequent paragraphs following each topic consolidate the answers and comments. These are by the presenter, unless indicated otherwise.

### **1. Inclusion of Liability in the Code**

It is difficult to elaborate on the reasons for not including a reference to liability in the current revised Code, as this subject was addressed early in the revision process. To further explain the principal reason, namely the lack of a clear relationship between liability and the scope of the Code, it may help to reprise the Code's fundamental intent. The Code aims to provide benchmarks for development, implementation and assessment of environmental management plans and to advise on best practices at sites targeted for marine minerals research, exploration and extraction.

In other words, the Code sets out a methodology for engaging in environmentally responsible marine mining. It does not address the consequences, including liability, of not doing so. Environmental risk management is one of the Operating Guidelines of the Code, and one advantage of following the Code is to mitigate the risk of exposure to environment-related liability issues.

However, States have agreed to the formulation of the liability and responsibility language in the ISA Nodule Regulations, and seem likely to agree to the same language in the draft Crust and Sulphide Regulations. Although arguably liability would then already be covered by Principle 1 of the draft revised Code on observing laws and policies of States and of international law, it would be useful to revert to the IMMS on this matter, proposing a formulation on liability and/or responsibility compatible with that of the ISA Regulations.

### **2. Difficulty of Definition of Risk**

The drafters of the Code recognize this difficulty, and therefore the Code does not attempt to define risk. Companies can use the section of the Code on environmental risk management as a starting point to define risk elements and to develop a responsible mining regime accordingly.

### **3. Need for Revision of the ISA Nodule Regulations (adopted in 2000)**

It would be useful to revise the Nodule Regulations. They were ahead of their time, and they are still very far-seeing, but many technical, legal and scientific developments have occurred since their adoption, even though it was only ten years ago. These developments have been reflected in the draft Crust and Sulphide Regulations. There is no harm in updating the Nodule Regulations accordingly.

Making all three sets of Regulations comparable and compatible would benefit miners, the ISA as Regulator, and the Enterprise, especially as all three sets are legally binding in the Area. Otherwise the ISA would have to monitor compliance with two sets

of environmental standards, and miners working with nodules, as well as with crusts and/or sulphides, would have to comply with two sets also. It will also assist States when they develop their national regulations.

**4. Inclusion of Decommissioning and Rehabilitation in Exploitation Definition**

Defining exploitation specifically to include decommissioning and rehabilitation in future ISA Regulations addressing this aspect received favorable comments from Members.

**5. Feasibility, Necessity and Cost-Effectiveness of Marine Environmental Rehabilitation**

Rehabilitation will be difficult to do in the deep sea, particularly because hard substrata are at a premium there. Sediments are much more prevalent. Entire deep sea communities are able to live only on hard substrata. If the hard surfaces are removed, they cannot switch to live on sediments instead. A fundamental environmental issue with mining crusts, nodules and sulphides is that they are hard substrata which mining removes.

In answer to the question from a Member on why nature cannot simply be left to take its course, unfortunately nature cannot replace nodules and crusts in normal biological time spans because they take millions of years to form. Nodules are a particular problem, because once they are mined only the sediments hosting the nodules are left. It was originally thought that removal of crusts by mining might not be as problematic as for nodules because a hard substratum always exists underneath the crust, which remains after the crust is mined. However, the very limited *in situ* research (conducted only by the presenter, so far) on recolonization of mined crust surfaces on seamounts, which compared recolonization on basalt (which usually underlies crust) with that on crust, indicated that there may be a community specialized to live on crust, for which basalt is not an acceptable substitute, at least not in the deep sea.

The removal of massive sulphides, even though they are also hard substrata, may be less problematic in one respect, namely that the specialized organisms attached to the sulphide chimneys have, to the best of the presenter's knowledge, been found there only during active venting. Once venting finishes, it seems that the deep sea fauna usually associated with non-hydrothermally active environments settle around inactive vents. It is the inactive vents that the current generation of massive sulphide miners are planning to exploit. However, these also pose the usual hard substratum issues. No *in situ* recolonization research on inactive vents has yet occurred, as far as the presenter knows, and the inactive vent sessile and benthic community is still poorly described, because attention – i.e., funding – has focused primarily on the active vent communities. The Nautilus Minerals company has conducted active vs. inactive vent community studies in their Solwara mining area off Papua New Guinea.

In summary, rehabilitation of the environment for these three types of mineral resources will include reintroduction of hard surfaces. Data from shallow-water analogue experiments and from artificial reef colonization studies suggest that deploying surfaces



made of neutral concrete on the mined sites might work, and this should not be prohibitively expensive. Nautilus will be trying this. The ISA could consider commissioning research on rehabilitation mechanisms and their cost. This would increase our knowledge of (re)colonization in the deep sea, which is important for adequate environmental restoration, and provide industry and potential investors with concrete financial information, which is also lacking, and contributes to the perception that rehabilitation is too expensive. Where the Code is concerned, in answer to a Member in this context, the industry has not (yet) set any limitations on rehabilitation in agreeing the parameters of the Code on this point.

#### **6. Potential Inhibitory Effect of Environmental Compliance Costs on Investment in Marine Mining**

Environmental compliance is now a generally recognized cost of doing business. This is true for all industries, not only marine mining. Responsible industries no longer expect to be able to treat the environment as an unquantified – hence "free" – externality that an industry can exploit at no cost to itself while expecting others in the society it is a part of to bear the cost of that exploitation through pollution, ill health, and other detrimental effects. However, costing environmental compliance activities is a very complex exercise and our society is still learning how to do it. The environment risks becoming a victim if it is just assumed, without data, that compliance will be too expensive and should therefore be disregarded in the interests of obtaining these useful minerals. This view is another version of the false dichotomy of environment vs. development, which should be laid to rest.

Nevertheless, the absence of robust quantification of environmental compliance measures is a serious problem, to whose resolution the ISA could make a vital contribution by commissioning and/or contributing to research, in consultation with industry, targeted specifically at costing marine mining environmental procedures. This research could occur during test mining in the Area, for which the ISA is required to give permission in any event. It could therefore incorporate such research as one of the conditions attendant on granting the test mining permit. The research results would benefit all the potential miners, who would then have solid figures for their environmental planning and profitability calculations.

The numerous questions from the Members on this topic suggest that rehabilitation methods and costs are of particular concern. These might therefore be appropriate issues for the ISA to consider tackling. They will be especially relevant to the development of the Regulations addressing exploitation.

It should be noted that the marine mining industry as represented in IMMS did not appear to consider that environmental compliance would be so costly as to inhibit investment, otherwise the Code would either not exist at all, or not in its present form.

**7. Potential for Collaboration Between Industry and Academia on Environmental Research**

This collaboration occurred extensively for nodules in the 1970s and early 1980s; it still occurs occasionally even now for nodules, and it is currently ongoing with sulphides. This option has delivered excellent results, particularly if the results are freely available in refereed scientific literature. Independent academic scientists generally expect to be able to publish their work. The ISA could play a useful role in promoting this synergy and to encourage this form of collaboration.

**8. Utility of Code as Non-binding Instrument for Environmental Compliance**

One Member remarked that the availability to States of a non-binding instrument like the Code was particularly useful, because it raised environmental consciousness to a higher level, until the circumstances are ready for States, jointly or severally, to adopt binding instruments for environmental protection.

The presenter concurred, noting that while she is not an enthusiastic proponent of a "soft law" approach to environmental issues in general, in certain cases, such as for an emerging industry like marine mining, it can be a good initial step, if the environmental baseline and criteria are set high in the non-binding instrument, and if there would otherwise be no or inadequate environmental regulation of the activity in the absence of that instrument.

**9. Responsibility for Payment of Environmental Compliance Costs in the Code**

The Code assumes that the mining industry will pay the environmental compliance costs. The presenter stressed that in the end we individuals all pay these costs, either as taxpayers if it is a State-owned or State-subsidized mining company or, in the case of private mining companies, as consumers of the goods using these minerals through the prices which should reflect those environmental costs. She noted that we individuals also pay if there is no environmental compliance, as we also pay for the costs that result from a polluted environment.

**10. Need for Standards in Code to Assess Predictability**

The Code is envisaged as part of an iterative process. It already sets minimum standards. These will be changed in due course to reflect improved standards as these are developed, especially if they are legally binding. The draft revised Code already includes more details than the original Code.

**11. Use of Preservation Areas in Rehabilitation**

Natural preservation areas left intact, such as the proposed untouched sulphide mound at the Solwara 1 sulphide mine site of Nautilus, and marine protected areas (MPAs) in general, are excellent but often insufficient. Placement of the MPAs in relation to the mine site must be oriented to maximize larval supply to the mined site, but this does not solve the problem of the missing hard substratum. The larvae must also have a suitable substratum to settle on, as already explained earlier. With nodules it might be possible to leave small piles of nodule rubble behind; this might also be possible with debris from sulphide mining. Nautilus will be trying the relocation of rocks with their

biology intact from the site to be mined to the site already mined behind the path of the miner.

## **12. Risk of Code Being Viewed as Cosmetic**

The presenter agreed with the Member's concern that the Code may be dismissed as "merely cosmetic and an exercise in being seen as doing the right thing." This concern can be allayed by considering the great emphasis placed by the Code on transparency and regular reporting of environmental activities, the wide dissemination of the reports and their availability free of charge to stakeholders, so that any interested parties can assess for themselves whether a company that has adopted the Code is complying with it.

## **13. Potential Conflict Between Confidentiality and Transparency**

The IMMS risks dilution of its own high transparency standard with the distinction in the current draft Code between proprietary and non-proprietary environmental data, where the former are to remain confidential. Here the approach by the ISA in its Regulations, where only technology-related data are confidential, and the sunset clause mechanism, as was discussed in the presentation, may provide a way forward for the Code. It will be proposed to the IMMS.

A Member commented in this context that States could impose binding confidentiality and transparency requirements at the national level that mirror those of the ISA at international level. In answer to the question of who takes the decision under the Code on whether data are proprietary or not, it is each company for itself; the Code does not provide an overarching standard or set of criteria for this determination.

## **14. Possibility for Industry-level Compensation Mechanisms**

There are precedents for mechanisms of pooled risk funding in the oil and shipping sectors, e.g., the International Oil Pollution Compensation Funds and the Protection & Indemnity Clubs. They could provide useful examples for developing a marine mining equivalent. The International Maritime Organization (IMO), under whose auspices ship-source pollution is addressed in a variety of innovative instruments and methods, could be a valuable source of information. Joint funding of environmental compliance activities, decommissioning and environmental disaster costs should certainly also be explored. However, a certain economy of scale for the industry as a whole - which requires a minimum number of companies or level of turnover unknown to the presenter - is required for this to be viable in a marine mining context. The ISA Regulations themselves require mining applicants to show financial ability to deal with environmental issues before permission to proceed is granted; this excellent idea might be expanded.

Concurring with the presenter's examples drawn from the shipping sector, one Member provided further useful context with a fascinating review of the development of the international ship-source oil-pollution compensation structure, adding that regional compensation mechanisms also exist; suggesting that this topic could be a subject of future attention by the Legal and Technical Commission, because if States do not put such mechanisms in place, the private sector will have no recourse but litigation, which is

not effective for environmental purposes; and concluding that the liability issue could usefully be revisited in this context. Another Member remarked that State responsibility under international law plays an important role in liability and compensation issues (e.g., LOSC Art. 235), and each State has a duty to ensure that its industry meets those obligations as well.

Other Members suggested reviewing in this regard: the abandonment funds set up by the oil and gas industry for the decommissioning of their rigs; the work by the International Union for Conservation of Nature (IUCN) on civil liability and compensation for environmental damage; the Liability Annex to the Protocol on Environmental Protection to the Antarctic Treaty; and the approach taken by the International Subsea Cable Protection Committee, whose chairman addressed the Members of the ISA in 2009.

The presenter commented that these interventions attest to the wealth of useful experience offered by established ocean industries, such as shipping and cable-laying. Ocean industries are fortunate in having, in the LOSC, one single overarching global treaty that addresses the oceans in their entirety, as well as the land, insofar as land-based activities affect the oceans. The ISA is in an advantageous regulatory position because it is working with a single industrial sector, like IMO with shipping, from which it can draw on expertise and best practice from all sectors, and tailor them to suit marine mining.

#### **15. Source of External Auditors and Auditing Standards**

The IMMS does not publish auditing standards or list accredited external auditors, including for performance reviews; the companies decide which to use. It may be useful to request companies to provide sources of standards and auditors for an Annex to the Code, which would be regularly updated as needed. It would also be useful to request the membership of the IMMS to advise whether uniform overarching standards and a recognized system of accreditors to qualify auditors exist. The Member raising this topic considered that this information could also be relevant for the ISA's external auditing of contractors.

#### **16. Mechanism and Funding for Stakeholder Consultations**

Neither the Code nor the IMMS provides any mechanism for these consultations. They are funded by the company.