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Towards the development of a regulatory framework for polymetallic nodule exploitation in the Area

Note by the Secretariat¹

1. After decades of being “on hold”, there is renewed interest in the potential for commercial exploitation of deep seabed polymetallic nodules. This new interest is largely the result of the following five factors:

- (a) A dramatic increase in the demand for metal;
- (b) An equally dramatic rise in metal prices;
- (c) The high profitability of mining sector companies;
- (d) A decline in the tonnage and grade of land-based nickel, copper and cobalt sulphide deposits;
- (e) Technological advances in deep seabed mining and processing.

Equally important is the impact of Papua New Guinea granting the first deep-seabed mining licence, in its territorial Bismarck Sea, to Nautilus Minerals Inc. of Canada. This has demonstrated that the private sector, and the financial institutions that support it, believe that deep seabed mining can be commercially viable.

2. In addition to the exploration contracts with the initial seven pioneer investors in 2001 and 2002, a second contract with Germany was signed in 2006. During its seventeenth annual session, in 2011, the Council of the International Seabed Authority approved the workplans of Nauru Ocean Resources Inc., sponsored by Nauru, and Tonga Offshore Mining Limited, sponsored by Tonga, for exploration for polymetallic nodules; and the workplans of the China Ocean Minerals Resources Research and Development Association (COMRA), and the Ministry of Natural Resources and the Environment of the Russian Federation, for polymetallic

¹ The present document is the executive summary of a report prepared for the secretariat by a consultant entitled “Towards the development of a regulatory framework for polymetallic nodule exploitation in the Area” and published as International Seabed Authority Technical Study 11.



sulphides, in the international deep seabed (see documents ISBA/17/C/2, C/3, C/4 and C/5).

3. At the eighteenth annual meeting in 2012, an additional five applications were approved, bringing the number of active exploration contracts issued by the Authority to 17, compared to only 8 in 2010. The five new applications were made by UK Seabed Resources Ltd. (sponsored by the Government of the United Kingdom of Great Britain and Northern Ireland); Marawa Research and Exploration Ltd. (a State enterprise of Kiribati); G-TECH Sea Mineral Resources NV (sponsored by the Government of Belgium and the Government of the Republic of Korea) for manganese nodules, and the Institut français de recherche pour l'exploitation de la mer (sponsored by the Government of France) for polymetallic sulphides. In July 2012, the Authority received applications from COMRA and the Japan Oil, Gas and Metals National Corporation for exploration of cobalt-rich ferromanganese crusts.

I. Exploitation framework

4. In recognition of these issues, and because the first contracts for polymetallic nodules exploration will expire in 2016, the Council of the International Seabed Authority requested during its seventeenth session that the Secretary-General prepare a workplan for the formulation of regulations for the exploitation of polymetallic nodules in the Area. This formulation is guided by article 17 of annex III, "Rules, regulations and procedures of the Authority", which provides that the Authority "shall adopt and uniformly apply" regulations. Article 3, paragraph 5, of annex III of the Convention provides that the regulatory relationship between the Authority and an operator shall be in the form of a contract obtained by approval of a plan of work.

5. Land-based regulatory regimes generally operate through a licensing process that in some jurisdictions is in lieu of contracts or in addition to contracts for the reasons discussed below. This discussion will mainly refer to a licensing procedure and the Authority may wish to consider adopting a licensing procedure in addition to the approval of plans of work as a contract as part of its regulatory authority. In any case, in complying with this request, the Authority faces the challenge of developing an exploitation framework that ensures that the exploitation of polymetallic nodules will (a) benefit mankind as a whole (including future generations) and (b) foster commercially viable and sustainable exploitation (including reasonable economic returns) of the Area's mineral resources.

II. Exploitation

6. Based on available deep seabed nodule information and experience gained from relevant land-based mineral developments, nodule exploitation and resource recovery can be expected to proceed sequentially from:

- (a) Relatively small but high-grade nodule areas with a rapid payback; to
- (b) A limited, but significant, number of large and high-grade nodule occurrences; and to

(c) Similar sized deposits but of relatively low grade. It is very important that this model be progressively modified and monitored. A “whole of the deposit” approach to nodule exploitation should be required that includes:

- (i) A comprehensive resource and reserve assessment of the proposed mining area;
- (ii) The adoption of a sequential mining plan that maximizes reserve recovery, utilization and metal recovery;
- (iii) Provision for periodic review and updating of the mining plan;
- (iv) Performance guarantees and “failure to perform” penalties, with the latter escalating over time to discourage behaviour inconsistent with approved mining plans, including the impermissible “high grading” of the deposit, which is an all too frequent practice involving only mining the highest grade areas to maximize profits and minimize costs over the shortest period possible.

III. Regulatory regime

7. The approach to the development of a regulatory framework for polymetallic nodules proceeds with an analysis of the factors that differentiate the regulation of deep ocean mining from its land-based counterparts. Some of the major issues of land-based regulation will translate to the regulation of polymetallic nodules exploitation. However, some issues (including the existing status of exploration, environmental issues, unique technical and logistical issues, the absence of traditional mine site communities and the relative strength and stability of the Authority as the regulator) will significantly differ and serve to change the focus, form and substance of the regulatory regime, compared to that of a land-based regulatory regime. Some differences will result from shifts in the risks inherent in exploiting polymetallic nodules under the regime of the Convention, compared to those under land-based operations. The differences also provide insight into how the relative components of a polymetallic nodule regulatory regime should be configured, and their relative “weighting”. A predominantly statutory framework is suggested, to be developed along with a limited standardized contract to detail terms that are specific to sites, contractors and sponsoring States, based on the regulatory concerns and issues mentioned above.

8. It should be noted that the present study does not deal with the specifics of an environmental regime for the exploitation of polymetallic nodules, as those issues are the subject of a parallel activity within the Authority, but it does specify key environmental components that will have to be developed and included in an overall exploitation framework. For example, environmental data will continue to be collected as part of an environmental monitoring plan during exploitation that will look at the environmental impact of exploitation, which is different to collecting environmental baseline data during limited sampling exploration. This will also require the analysis of all the environmental data collected to date to aid in understanding the cumulative environmental impact of all aspects of exploitation. In addition, analysis of the data collected in the environmental monitoring programmes during exploitation will provide important feedback to (and perhaps inform modification of) the environmental monitoring plans and systems.

9. The factors that differentiate polymetallic nodule exploitation from land-based operations under single sovereign control (or more accurately, in modern times, under a hierarchical system of various national, provincial and local controls), and the inherent shifts in risk will also guide the substantive development of the regulations and steps in the licensing process. Most importantly, these differences and shifts in risk lead to the conclusion that a “staged” or “phased” licensing system for polymetallic nodules exploitation be developed. It is suggested that, prior to the expiration of an exploration licence, the contractor (if interested in proceeding to the mining phase) be required to first apply for a provisional mining licence based upon preparation and submission of a prefeasibility study and workplans to undertake a detailed bankable feasibility study based upon a pilot polymetallic nodule mining operation in the contract area. The suggested validity of a preliminary mining licence is three years. The application for a provisional mining licence would include, inter alia:

- (a) The technical, fiscal and environmental qualifications of the proposed operator;
- (b) Approved funding;
- (c) A prefeasibility study based on the contractor’s previous exploration, transportation, processing and testing data, and analysis, including an environmental impact assessment based on the contractor’s work during the exploration stage;
- (d) Plans of work for the term of the provisional mining licence, including, inter alia:
 - (i) Plans for undertaking a detailed feasibility study based on a pilot commercial site;
 - (ii) Expenditure schedules;
 - (iii) Development schedules;
 - (iv) Mining methods;
 - (v) Production estimates for the pilot site during the term of the provisional licence and a tenured mining licence;
 - (vi) Environmental management plans, including closure and rehabilitation;
 - (vii) Transportation and logistical specifics (including accident prevention) for the operation;
- (e) Performance assurances and guarantees;
- (f) Host and/or sponsoring Government specifics;
- (g) Training and corporate social responsibility;
- (h) Size and area of concession.

10. The exact requirements of a prefeasibility study are included as a point of recommended future work.

11. Using information contained in the application for a provisional mining licence, including a prefeasibility study and environmental impact assessment, the International Seabed Authority would be able (based on a recommendation to develop an assessment methodology as future work) to determine whether the

technical, environmental and economic analysis and conclusions reached would support the granting of a provisional mining licence to undertake a pilot commercial operation. If the pilot commercial operation is successful and a full detailed bankable feasibility study, including a full environmental assessment, indicates that a full-scale mining operation could be mounted and funded, the contractor could apply for a “tenured” mining licence. An application for such a licence would include the data, information, analysis and conclusions of the detailed bankable feasibility study and full environmental impact assessment and proposed workplans. This, in turn, would provide data, information and analysis allowing the Authority to determine (again, based upon a recommendation to develop an assessment methodology as future work) whether a full-scale mining operation could be undertaken in a manner that was acceptable and environmentally minimally invasive.

It is suggested that an application for a tenured mining licence include and be conditional upon:

- (a) Successful completion of the pilot commercial study under the provisional licence;
- (b) Approval by the Authority of a detailed bankable feasibility study and full environmental impact study;
- (c) The technical, fiscal and environmental qualifications of the proposed operator;
- (d) Approved funding for the operation;
- (e) Plans of work for the term of the tenured mining licence, including, inter alia:
 - (i) Expenditure schedules;
 - (ii) Development schedules;
 - (iii) Mining methods;
 - (iv) Production estimates for the term of the tenured mining licence;
 - (v) Environmental management plans, including closure and rehabilitation;
 - (vi) Transportation and logistics specifics (including accident prevention) for the operation;
- (f) Performance assurances and guarantees;
- (g) Host and/or sponsoring Government specifics;
- (h) Training and corporate social responsibility;
- (i) Size and area of concession.

12. In summary, a staged or phased licensing process, including the requirement of a prefeasibility study for a provisional licence, would allow the International Seabed Authority to make an intermediate decision as to whether or not to allow a pilot project to fully demonstrate viability and safety, and the provisional licence would provide an important measure of control and power to claw back the project should unforeseeable problems arise, without having to suspend or terminate a full-scale mining project.

13. Other licensing options considered include such types of exploitation licensing as production-sharing and contracts of work, and auctions for some blocks. The trade implications of the regulatory regime are briefly discussed and will be an interesting aspect to consider in developing the regulatory regime.

14. In developing a legal framework and its constituent components and functions, emphasis is placed on finding the optimum fiscal balance to provide sufficient profitability, while identifying the threshold standards for environmental and mine health and safety. The development of the regulatory system will also help to determine whether polymetallic nodule exploitation can provide sufficient returns to benefit mankind as a whole, and respond to real and perceived environmental concerns, before full-scale mining can commence for polymetallic nodules and other resources in the deep ocean.

IV. Fiscal regime

15. While the fiscal framework for nodule exploitation is reasonably clear and consistent, it is not easily implemented and does not lend itself to definitive analysis. Three issues are particularly problematic: the setting of fiscal rates based on comparable land-based minerals; the problem of identifying tax and cost accounting codes on which fiscal calculations can be made; and the concept that a simple system can be developed that does not burden the Authority or mining investors. The overarching issue is that a royalty-based fiscal regime is faced with a number of fundamental, but in some cases incompatible, objectives. For example, a high degree of incompatibility exists between the objective of achieving economic efficiency and that of administrative efficiency. In terms of decreasing administrative efficiency, the most common royalties would be ranked as follows:

- (a) Unit-based royalties based on units of volume or weight;
- (b) Ad valorem royalties based on value of sales;
- (c) Hybrid royalties;
- (d) Profit-based royalties.

In contrast, in terms of economic efficiency, the ranking would be reversed. The selection of an appropriate royalty system is invariably a compromise between these objectives. The choice faced by the Authority will be influenced by the size and diversity of the mining operations and the strength of the regulatory regime, which together will determine the degree of administrative complexity that can be accommodated without undue delay.

16. In addition, because exploitation will not be a public enterprise, questions immediately emerge about how to appropriately divide profit and risk. These, in turn, raise difficult resource rent questions about capturing windfall profits and rents in the name of social justice. Both environmental destruction and the division of rent must somehow be accommodated in the eventual fiscal package.

V. Future markets, future prices and future development

17. Nickel, copper, cobalt and manganese markets, prices and resource development are inescapably linked to global economic growth and the supply of, and demand for, these commodities. Present markets for nickel, copper, cobalt and manganese are demand-driven, in large part by China and other Asian countries, and global supply is adequate to meet demand. For the intermediate term of three to seven years, however, the demand for nickel and copper is expected to severely test the market's capacity to respond because of both decreasing deposit grades and the time required to bring new capacity on line. For the longer term of seven to ten years, it is anticipated that the demand for nickel, copper and possibly cobalt and manganese may exceed supply unless significant new land-based deposits are discovered, or alternative sources, such as the deep seabed polymetallic nodules of the Area, are exploited.

VI. Corporate social responsibility

18. It is proposed that the International Seabed Authority, with inputs from industry and developing nations, consider the development of a hybrid social business model for industry that explicitly sets an expectation that corporate social responsibility for operations in the Area will simultaneously pursue two objectives, namely, (a) specific positive social impacts and returns and (b) specific baseline financial returns. The hybrid social business model is a significant modification of the traditional business model, which only incorporated general levels of corporate social responsibility. In this respect, it differs from the more pure social business model of Yunus (2010) and others that focused primarily on non-profit industries.

19. In terms of addressing the “lost benefits” issue, the hybrid social business model may be of particular interest to the Authority, as follows:

(a) First and foremost, the concept explicitly addresses the issue of “dual challenge”, in that the corporation will fund/assist specific programmes that will be of value to all humankind, for example, the sustainable development of deep seabed resources to preserve the marine environment and to reduce poverty, while meeting the return on investment requirements of investors;

(b) Secondly, and more specific to the Authority, the hybrid social business model is directly applicable to supporting the extant International Seabed Authority Endowment Fund for Collaborative Marine Scientific Research on the International Seabed programme;²

(c) From a market perspective, a hybrid social business model company programme has significant appeal to many potential investors and shareholders (particularly diversified portfolio investors) who wish to invest in socially responsible corporations.

20. The linkage of hybrid social business and marine scientific research with issues directly relevant to the Area and with developing nations' local, national and

² See article by Michael Lodge entitled “Collaborative Marine Scientific Research on the International Seabed” in *Ocean Sovereignty*, Vol. 3, No. 1, 2008 (www.isa.org.jm/files/documents/EN/efund/JOT-article.pdf).

coastal management activities represents a win-win opportunity for the Authority, industry and developing nations and it is strongly recommended that the Authority address the issue as part of the regulatory and fiscal regime for polymetallic nodule exploitation.

VII. Conclusion and recommendations

21. The potential for polymetallic nodules, polymetallic sulphide and cobalt-rich manganese crust exploitation within the Area is arguably higher now than at any other time in history. This impending reality requires that the Authority, in its capacity as, essentially, the “Mining Ministry of the Area”, quickly prepare to meet this rapidly evolving challenge. Doing so requires the development of a strategic framework that allows the Authority to have in place the necessary mandates, organizational capacities (technical and administrative), policies and regulations (implementing rules and regulations) and capacities (fiscal, manpower and specialties). The following is an attempt to broadly identify the major organizational, fiscal and research recommendations that must be addressed, over the next three to five years, as part of an overall strategic plan to ensure the ability of the Authority to meet the challenge.

A. Organizational

22. It is recommended that the International Seabed Authority consider the development of an internal mining inspectorate with the specific responsibilities of maintaining oversight and compliance with all exploration and exploitation licence activities. This would specifically include a mining registry, a compliance office, a data and archive centre and an inspector-general’s office. There are many different administrative models, but for efficiency, capacity and security, a separate operating unit would be advisable. Such a responsible agency does not presently exist within the Authority, which, in accordance with the evolutionary approach to its establishment reflected in the 1994 Agreement, has been principally set up as an international organization that provides meeting services to member States and expert bodies. However the present high level of interest, coupled with the need for many operators to apply for exploitation licences by 2016, indicates a critical need to begin detailed discussions for the funding, planning and implementation of such an “administrative agency” capacity within the Authority in the near future. In addressing this need it is recommended that the Authority undertake a comparative analysis of representative administrative agencies as a basis for the development of a similar capacity within the Authority. Such capacity would need to include transparent funding mechanisms, whether through cost-recovery or an alternative basis, secure data management and analysis, maintenance of a mining claims registry to international standards (ISO 4001) and financial and accounting capacity.

23. It is also recommended that past and present environmental rules, regulations and requirements be incorporated with and within the evolving exploitation frameworks for polymetallic nodules and other metal resources within the Area. This is logically a Legal and Technical Commission function but there needs to be transparent engagement with the deep-sea mining industry and other stakeholders in this process. The real concern is that:

(a) The process not be viewed as an ad hoc activity but rather, as a critical component of whatever “responsible agency” ensues;

(b) Working groups and committees serve as a defined interface for environmental regulations for both prospecting and exploitation;

(c) There be a competent body providing continuity across differing resources (polymetallic nodules, polymetallic sulphides and cobalt-rich crusts);

(d) The process identify and address environmental issues as they might arise;

(e) The process become a permanent part of the “responsible agency”. More importantly, it is argued that it would benefit the Authority if industry members were to recognize that there was a formal, continuing and identified group monitoring their activities.

24. It is recommended that the Authority undertake a study specific to the development of a set of unified and common operating procedures, as is done within most on-land mining ministries and agencies, for the evaluation, licensing and monitoring of polymetallic nodules, cobalt-rich manganese crusts and polymetallic sulphides prospecting, exploration and exploitation.

B. Fiscal

25. It should be ensured that whatever resource rent process is employed is simple, equitable, transparent, defensible and responsive to change.

26. Monitoring should be carried out to ensure that the Authority receives its fair share of resource rents after deductions and that host country commercial policies do not give an unfair advantage to the commercial exploiter of the resources.

27. The “transactional” part of the mineral-processing portion of the “mine-to-market” chain should be monitored, to ensure that all transactions are “arm’s length” and closely reflect prevailing market prices for metals. This will be particularly critical with respect to any royalty-based resource rent capture scheme that is ultimately adopted.

C. Research and study

28. It is recommended that over the next three to five years an overall framework of activities be developed for the Authority in conjunction with potential polymetallic nodule developers and member countries to establish the internal structure and capacity of the Authority to manage polymetallic nodule exploitation in the Area.

29. A component analysis of a tax-like infrastructure (incorporating rules, procedures and administrative staff, audits, legal decisions, etc.) should be conducted for determining project profits and ensuring that optimum resource development and financial flows are achieved.

30. A cost-benefit analysis should be undertaken to determine the sensitivity levels for fees and costs associated with polymetallic nodules exploitation.

31. It is recommended that an evaluation be undertaken by tax professionals with international experience and knowledge of the special characteristics of mining and of the issues, framework and applicability of business tax code for polymetallic nodules development within the Area.

32. Framework studies specific to the following areas of polymetallic nodule exploitation activities should be undertaken:

- (a) Monitoring and compliance;
- (b) Resource recovery, utilization and valuation;
- (c) Creation of implementing rules and regulations for legal regime;
- (d) Structure of an environmental mining plan.

33. It is recommended that definitional meetings be conducted to reach agreement on the structure and requirements for:

- (a) Pilot mining;
 - (b) Prefeasibility study metrics;
 - (c) Classification of resources and reserves specific to seabed mining.
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