International Seabed Authority ISBA/11/C/5

Council

Distr.: General
12 August 2005

Original: English

Eleventh session
Kingston, Jamaica
15-26 August 2005

Explanatory notes relating to the draft regulations on prospecting and exploration for polymetallic sulphides and cobalt-rich ferromanganese crusts (ISBA/10/C/WP.1)

Preamble

1. The objective of the present explanatory notes is to provide information to the Council of the International Seabed Authority regarding the rationale followed by the Legal and Technical Commission during its formulation of several key elements of the draft regulations on prospecting and exploration for polymetallic sulphides and cobalt-rich ferromanganese crusts (ISBA/10/C/WP.1). Reference to, and preliminary discussion of, these key elements took place during the meeting of the Council following the presentation of the draft regulations by the Vice-Chair of the Commission during the tenth session. In accordance with the statement of the Secretary-General of the International Seabed Authority in paragraph 36 of his report under article 166, paragraph 4, of the United Nations Convention on the Law of the Sea (ISBA/11/A/4), the Commission has prepared these notes to facilitate further deliberation on the regulations.

2. Five years of uncertainty requiring clarification were raised during the Council discussion during the tenth session, namely:

(a) The reasons for the establishment of a single set of regulations for the two types of resources, rather than different ones for each type;

(b) The reasons why the exploration block size was chosen as a 10 kilometre-by-10 kilometre cell;

(c) The reasons why the number of blocks to be allocated to an exploration programme was chosen to be 100;

(d) The reasoning behind the requirement to ensure that all blocks in a single application were contiguous before relinquishment;

(e) The reasoning behind the rate and apportionment of blocks during relinquishment.

These themes are addressed in separate sections below.

05-45929 (E) 120805
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Rationale behind a single set of regulations for the two deposits

3. As noted by the Secretariat in the document entitled "Considerations relating to the regulations for prospecting and exploration for hydrothermal polymetallic sulphides and cobalt-rich ferromanganese crusts in the Area" (ISBA/7/C/2), polymetallic sulphides and cobalt-rich ferromanganese crusts have entirely different two- and three-dimensional forms from those of typical manganese nodule deposits. Unlike nodules, which exist predominantly in a carpet-like manner across the seafloor surface in certain parts of the world's oceans, polymetallic sulphides and cobalt-rich ferromanganese crusts occur mainly as localized deposits, often over an area of a few square kilometres.

4. While the localized form of both polymetallic sulphides and cobalt-rich ferromanganese crust deposits clearly contrasts with that of manganese nodules, spatial organization of these two localized deposits on the seafloor is also different. In the case of cobalt-rich ferromanganese crusts, the deposits occur principally on seamounts and shoal areas of the deep ocean, on topographic features that are distributed more or less randomly. Polymetallic sulphide deposits, however, while occurring in a similarly localized manner, are more systematically sited in their active form, as sites spaced along the line of the mid-ocean spreading ridge axes. Polymetallic sulphide deposits occur in their inactive form, but less systematically, as once they reach a passive form, they are moved away from the spreading axis during the process of plate motion.

5. Despite these differences in location style, the anticipated mining operation to be undertaken to recover high-grade ore will be essentially the same — focused extraction of highest-grade ore at one site, before moving of operations to another site. For this reason, the Commission considers it inappropriate to provide two different sets of draft regulations for these deposits.

6. It should be noted that far less is known of the distribution of these types of deposits than was understood of manganese nodules at the same stage of development of regulations for manganese nodules. Very few sites of either polymetallic sulphide or cobalt-rich ferromanganese crust deposits have been rigorously appraised for their potential as mine sits. It is possible, however, to make estimates of the likely distribution of each of the deposits from data available largely from the academic community, as presented in summary form by experts in these fields (for example, Dr. James R. Hein, Dr. Peter Herzig and Dr. Kim Juniper at the tenth session (see ISBA/10/C/4 of 28 May 2004)).

Rationale behind selection of block size

7. Cobalt-rich ferromanganese crusts, while occurring extensively on basement surfaces in the deep ocean, are considered to be mineable at water depths between 500 and 1,500 metres. This restricts mineable sites to less than 10 or a few tens of kilometres across.

8. Polymetallic sulphide sites normally have a surface expression of less than 10 kilometres, although they are likely to have extensive subsurface deposits, perhaps for a number of kilometres laterally.

9. The selection of an approximately 10 kilometre-by-10 kilometre cell, or multiple cells to cover a single site, appears to be most practical with respect to covering exploration areas of each deposit.

Number of blocks in an exploration area

10. In order to illustrate the reasoning behind the selection of 100 as the appropriate maximum number of blocks within a single exploration application, the Commission has provided a simplified calculation of mineable area needed by a potential contractor:

> *For cobalt-rich ferromanganese crust, an average figure of between 20 and 40 kilograms (kg) per square metre (m^2) of recoverable crust is required to make a mining operation economic.*
>
> *For a 20-year lifetime for a mining operation, during which production is assumed to be 2 million tons per year, a total of $20 \times 2 \times 10^9$ kilograms must be recovered.*
>
> *Based on the above total recovery and rate of recovery, the mine site (sites) must cover an area of $20 \times 2 \times 10^9$ kg/40 kg m^{-2}.*
>
> *This total area works out to be 10^9 square metres.*
>
> *According to the draft regulations, the contractor's original maximum exploration area of 100 blocks will cover 10^{10} m^2, therefore 10 times the necessary mine site(s). The relinquishment to 25 blocks suggests (if appropriate grade is identified) that those blocks retained by the contractor will contain 2.5 times the crust required to support a mining operation for 20 years.*

Contiguity of blocks

11. Estimates of between 30,000 and 50,000 seamounts exist for the Pacific Ocean, and few have been explored for cobalt-rich ferromanganese crust. Seafloor mapping of the area of potential resource is not sufficiently complete to allow an accurate identification of target seamounts and this will be achieved during prospecting. The requirement of contiguous blocks would no doubt cover seafloor less attractive to contractors, which would eventually revert by relinquishment to the Authority. The contractor would nonetheless be left with prime sites within the 25 retained blocks.

12. For polymetallic sulphide deposits, there are far fewer potential mineable sites, and stipulating contiguity for the blocks is even more justified to ensure that all the best sites are not cherry-picked in the first licence round. Owing to still-scant data for these hydrothermal sites, our predictions of polymetallic sulphide sites are much more tenuous than for cobalt-rich ferromanganese crust, and the contiguous block geometry encourages the contractor to explore along and across the mid-ocean ridge. Along the ridge in the active zone, there are still likely to be unknown sites and possible mine targets, and across the ridge (that is to say, on to extinct polymetallic sulphide sites that have moved away from the ridge), we have even less knowledge, but we would predict mature (and potentially richer) polymetallic

sulphide deposits. In either case, the strategy will increase a general understanding and knowledge base of controls on polymetallic sulphide formation at mid-ocean ridge systems for future contractors.

Relinquishment

13. It was recognized that, while the requirement that blocks in original applications to be contiguous would reduce the likelihood of cherry-picking too many prime potential mine sites, it would also be likely to result in licensing of significant areas of low grade. This would naturally allow for the relinquishment process.

Additional notes on changes to regulations on protection of the marine environment

14. The Commission felt that it might be useful to make additional comment in these notes on the decisions taken to place particular emphasis on the protection of the marine environment, since this is another area where substantial changes have been made. In particular, it is useful to consider the differences between the ecosystems of nodule deposits and those of sulphides and crusts in the context of a sustainable deep seabed management regime.

15. In particular, the Commission recalls the way in which polymetallic sulphide and cobalt-rich ferromanganese crusts occur in parts of the marine environment that are now known to host complex — and, in many ways, unique — marine ecosystems, and of a type that may be susceptible to major trauma. There is some potential for serious and permanent harm in these areas during the process of seabed mining. While this may also be, to some extent, the case for nodule mining (we are still not absolutely sure of this), the nodule deposit is one that, by its nature, covers so wide an area that the extent of such harm may be mitigated. For sulphides occurring at active sites, the deposits are very localized, hence the potential impact at a mine site is likely to be significant. For these reasons, there has been much more emphasis on the protection and preservation of the marine environment in the draft regulations on prospecting and exploration for polymetallic sulphides and cobalt-rich ferromanganese crusts in the Area.