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## **Manpower requirements of the Authority and related training needs: preliminary report of the Secretary-General**

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"The Government has sent instructions to its delegation to the United Nations Conference on the Law of the Sea to acquaint delegations to the Conference with the position taken by Costa Rica in the face of this unilateral action by the United States Government.

"The Government of Costa Rica believes that, instead of taking unilateral action which discourages the search for

a consensus on the matter, every possible international effort should be made to find a suitable solution based on international practice, doctrine and justice."

(Signed) L. A. VARELA  
Chargé d'affaires, delegation of Costa Rica  
to the Third United Nations Conference  
on the Law of the Sea

## DOCUMENT A/CONF.62/82

### Manpower requirements of the Authority and related training needs: preliminary report of the Secretary-General [Original: English] [17 August 1979]

#### Introduction

1. At the 110th plenary meeting, the Chairman of the First Committee suggested that the Secretary-General might prepare an analysis of the manpower requirements of the Authority in the first five years of its existence in order to ascertain what the training needs of developing country personnel will be, particularly in the relevant scientific and technical fields. The Chairman of the First Committee also suggested that the Secretary-General might compile a list of the institutions that could offer education and training in the appropriate fields. These studies were suggested as preliminary steps toward the establishment of a special United Nations training programme.

2. At the 115th plenary meeting, the delegation of the United Kingdom suggested that, immediately following signature of the convention, a provisional training fund should be established, financed by voluntary contributions, to provide training awards for qualified students in the disciplines identified as being relevant to the needs of the Authority and the Enterprise.

3. The brief discussion that was held at the 115th and 116th meetings on the question of training showed that a sustained effort and organization would be required and the first objective was to define requirements so that they could be met in a consistent and orderly manner, employing all available resources and means as efficiently as possible.

4. It may be noted that the request of the Chairman of the First Committee focused on a particular aspect of training, namely manpower needs of the Authority at the early stage, and before the full impact of the provisions of the convention dealing with training and related issues would be felt. This would be the short-term or immediate aspect to the long-term development of manpower resources associated with "the expanding of opportunities for participation" in the activities of the Area and the rational management of its resources. The question of training relates not only to the manpower requirements of the Authority but also to its functions, and the responsibilities of the Authority will not be limited to on-the-job training in marine mining operations. According to the provisions of part XIV of the revised informal composite negotiating text (A/CONF.62/WP.10/Rev.1), the Authority will also be required to furnish technical assistance to developing countries, to promote and conduct marine scientific research, and to facilitate information exchange on marine science and technology. All such activities may be viewed as essential components of the transfer of technology process, but this relationship would not change or in any way lessen the responsibilities of the Authority in these areas. Training programmes of the future, whether initiated or conducted or partially supported by the Authority, would therefore be expected to encompass a wide range of activities and educational processes and institutions. There might be seminars and specialized conferences,

expert meetings, fellowship schemes, information programmes, programmes to develop special curricula, formal training courses, as well as on-the-job training for managerial, research and technical staff. Future programmes would also co-ordinate relevant programmes conducted at national, bilateral, regional and international levels. While the requirements of the Authority and Enterprise call for special focus on education and training in deep-sea mineral development, the Authority would also become involved with more general training programmes in marine science and technology and marine affairs.

5. The general question of training has, in a sense, been before the Conference for a number of years. In addition to the two previous reports of the Secretary-General which concern, in part, the manning requirements of the future Authority—the first on alternative means of financing the Enterprise (A/CONF.62/C.1/L.17),<sup>2</sup> and the second on costs of the Authority and contractual means of financing its activities (A/CONF.62/C.1/L.19)<sup>3</sup>—there are comments and recommendations concerning training in earlier reports of the Secretary-General. A report on a study on international machinery submitted to the Committee on the Peaceful Uses of the Sea-Bed and the Ocean Floor Beyond the Limits of National Jurisdiction<sup>4</sup> listed training as one of five main functions for the future body, noting that ocean-based industries would require a variety of specialists in a wide range of basic scientific disciplines as well as in many engineering fields and that there was a world-wide weakness in most of these professions, particularly in developing countries. This early report suggested that a sustained training effort would be necessary if these countries were to be associated with activities in the area. The following tasks that were suggested for the Authority are still pertinent:

"(a) Organizing and implementing training programmes. These could be organized in various ways as, for example, in co-operation with Governments concerned, with regional organizations or groups, with authorized operators, as well as with those bodies within the United Nations system implementing projects in this field;

"(b) Ensuring that operators authorized under the international régime fulfil their obligations with respect to the training of personnel;

"(c) Allocating part of any funds which may become available to the international machinery from the proceeds of economic sea-bed activities to finance such training programmes when deemed feasible;

<sup>2</sup>Official Records of the Third United Nations Conference on the Law of the Sea, vol. VI (United Nations publication, Sales No. E.77.V.2).

<sup>3</sup>Ibid., vol. VII (United Nations publication, Sales No. E.78.V.3).

<sup>4</sup>See Official Records of the General Assembly, Twenty-fifth Session, Supplement No. 21, annex III.

“(d) Ensuring proper placement of fellows under bilateral or multilateral fellowship programmes;

“(e) Organizing the widest possible dissemination of relevant information on marine science and technology.”

6. Organizations of the United Nations system continue to stress that scarcity of manpower resources is the chief limiting factor to the development of national efforts and international co-operation as regards the study of the oceans and the rational use of their resources, and to urge that marine education and training programmes be strengthened, whether by increasing allocations for study grants, fellowships and training courses, or by increasing the assistance States provide for the development of national and regional programmes and facilities. Emphasis is increasingly placed on the importance of national commitment to purposeful marine science and technology training and on efforts which create or promote public awareness of the oceans and their resources.

#### **Forecasting manpower requirements**

7. The manpower needs of the Authority will, in the first place, depend on agreement on the nature and scope of its functions. Since the regulatory and operational functions of the Authority have no precedent elsewhere, the organization and staffing of existing international bodies can offer very little guidance. A reasonable forecast of manpower requirements would also call for knowledge of the requirements of the future industry and an understanding as to the approaches the Enterprise might be expected to adopt in its early formative years. Full knowledge of the methods and technologies to be used by the industry and of the rate of technological development would greatly facilitate forecasting, but this is not available as yet. This situation was noted in documents A/CONF.62/C.1/L.17 and 19, and bears repeating.

8. A precise organizational structure with estimates of the numbers and levels of expertise of the people required in each category cannot be constructed on the basis of the informal composite negotiating text alone. The text cannot be expected to indicate precisely the scope of work required in the future since the rules, regulations and procedures to be established would substantially affect not only the scale of monitoring activities of the Authority but also the extent of the analyses required for decision-making. To take but one example: the degree of flexibility permitted in the size of mine sites will directly affect the administrative responsibilities of the Authority in that the greater the degree of flexibility permitted, the greater the costs to the Authority in terms of both the need for more highly skilled personnel and the need to acquire an independent data base to undertake the necessary evaluations. Nor can the text be expected to give any guidelines as to whether certain functions are best performed by the membership of the various expert bodies, by the substantive staff, by external advisory and consultancy services, by co-operative and co-ordinative arrangements, formal and informal, with organizations of the United Nations system, with other intergovernmental organizations and the international scientific community, or whether a combination of forces would be required to enable the Authority to meet its responsibilities for certain functions. The future international machinery may be said to consist of member States, a substantive secretariat, specialized agencies and other United Nations bodies, and independent scientific and technological expertise, so that co-operative efforts in many subject areas may prove to be the rule. As far as training is concerned, it would seem logical to take into account the needs of all elements of the future international machinery, and not only of its secretariat.

9. The process of evaluating manpower requirements unavoidably raises a number of important questions which

have a bearing on other matters also, for example: the scope and degree of detail of preparatory work conducted prior to the establishment of the Authority; the place of the Authority in the United Nations system and the kinds of arrangements which would best ensure the co-operation and co-ordination needed in a variety of subject areas; the proper scope of interpretation, in terms of functions of the Authority, that should be given to such articles as the one dealing with “accommodation of activities” in the area, or the proper scope of activity that should be associated with such functions as the one concerning “the progressive development of international law and its codification”; and the extent to which certain key functions should be considered the province of the staff of the Enterprise rather than of the rest of the Authority. This latter question raises particular difficulties in attempting to assess manpower requirements since some types of expertise needed by the Enterprise for its planning and operational activities may not be significantly different from those required for carrying out the regulatory functions of the Authority. The request of the Chairman of the First Committee gave special attention to the first five years of the Authority since that would be when it would be most affected by any scarcity of qualified and experienced personnel. In terms of over-all manpower requirements, however, there might not be any substantial difference in the total size of the staff of the Authority in the first five years compared to later. The actual numbers of contracts or mine sites under production would not determine the total workload of the Authority so much as the scope of preparatory work conducted prior to its establishment. The numbers of personnel performing at-sea monitoring or inspection functions would, of course, increase in proportion to the number of mine sites undergoing exploitation, but again this increase might not substantially affect the total number of personnel required. Substantial changes in the composition of the staff of the Authority may occur after a few years, however, since some functions may become more or less important with time. For example, the amount of activity with respect to the development and modification of various rules, regulations and procedures would tend to decline with time and practice. The same might be true of some functions associated with the transfer of technology as the rate of innovation slows down. Such changes would tend to affect the priority given to different types of expertise in the manning table of the Authority, and in training programmes. Depending on the initial working relationship established between the staff of the Enterprise and the staff of offices of the Authority, it is also conceivable that significant changes would occur with time. For example, should it be decided that some sharing of expertise were necessary in the early years, any such arrangements would be dispensed with as the Enterprise developed its own body of experts. A substantial difference in over-all manpower requirement could occur by the fifth year or later, depending on the kinds of arrangements employed by the Enterprise. For any single mining project, it is very likely that before commercial production starts the various prior development or preparatory stages would need less personnel in most categories.

10. It should be recalled that there has been no discussion touching on the estimates contained in documents A/CONF.62/C.1/L.17 and 19. In the absence of substantial new evidence, therefore, there is very little justification for increasing, or decreasing, the total number of professional staff estimated for the purposes of determining the administrative costs of the Authority. Detailed discussion of the manpower requirements of the Authority, particularly in the light of any preparatory work that might be undertaken on the formulation of rules, regulations and procedures, could therefore be expected to lead to some adjustments in the comparative numbers of lawyers, economists, and technical and financial experts indicated in that document. In the mean

time, it might be noted that a significant number of scientists and scientific administrators would be needed, thus giving a stronger emphasis to the science and technology category of staff than presently indicated. Similarly, very little additional evidence can be given that would warrant any major change in the assessment given in A/CONF.62/C.1/L.17, namely, that the Enterprise would require 75 Professionals by its third year of operations. Again a detailed consideration would serve to clarify whether such a number would automatically be required under any type of arrangement, or with any size or number of operations, and whether that number of staff, or any other, should be broken down into categories of permanent employees, associated staff (integrated into the Enterprise for the purpose of a particular project, or of a planning or operational phase only), and personnel taken on in a trainee capacity.

#### The particular requirements of the Enterprise

11. An examination of the informal composite negotiating text suggests that the functions of the Authority might usefully be separated into general functions (not related to contracts), regulatory functions, and the operational functions of the Enterprise. Manpower requirements and associated training needs are probably best treated by examining the particular needs of the Enterprise separately from the rest of the Authority. Such separate consideration is suggested for the following reasons:

(a) The particular interests and problems the Enterprise will have with respect to the transfer of technology, as opposed to the broad range of responsibilities to be assumed by the Authority in this field;

(b) The close relationship that would be established between manpower requirements and the types of different arrangements the Enterprise may decide to enter into, as well as the size of the operations involved;

(c) The strong emphasis that would be placed on business management, physical sciences, engineering, and systems design and management for Enterprise staff and the scarcity of such personnel relative to those in legal, economic, administrative and financial fields, particularly in developing countries;

(d) The tendency to separate staff required throughout system development and operation from other staff required according to the type of operation or stage of operation, and for which a schedule of personnel requirements would probably be established;

(e) The particular emphasis that will be placed on subcontracting certain advisory functions and one-time planning or operational needs.<sup>5</sup>

12. The above considerations do not affect, or do not affect to the same extent, the manpower requirements of the rest of the Authority. The Enterprise, certainly, will have a particular need for highly specialized personnel capable of modifying or creating equipment, as well as personnel who understand its operation. Its administrative staff also would need direct experience in marine operations. A more detailed consideration of the staffing needs of the Enterprise might be assisted by an examination of the staff of State-run enterprises.

13. According to the informal composite negotiating text, activities of the Enterprise, whether conducted alone or in association with other entities, may include some or all of the

following: prospecting, exploration, exploitation, transportation, processing and marketing. Its plans and operations would be subject to the general policies of the Authority, to the rules, regulations and procedures adopted, and to the directives and control of the Council. At the same time, the Enterprise will be essentially responsible for setting up and conducting its own operations, in whatever form, for choosing the mining and processing systems and associated technologies it will employ and for negotiating actual terms of transfer, for establishing its schedule of personnel and training requirements, for loan applications, marketing, etc. In other words, it will be responsible for most of the activities normally associated with an independent venture. It would be feasible, therefore, for the Enterprise to have its own finance and personnel management staff, project planning and operational management staff, and a small legal staff for preparation of various contracts and forms of association, agreements with States, international organizations and other entities, and actions.<sup>6</sup>

14. Some of the personnel required will need prior and direct experience of the sea-bed mining industry (including knowledge of its research and development phase), particularly those that will provide systems engineering, technical direction and management of operations at sea and those handling procurement of goods and services. Other essential personnel may not need such direct experience and may be drawn from a number of fields, not all necessarily marine-related. In either case, functions will be performed to various degrees depending on the phase of a project and may be subcontracted because of the variability of manpower requirements over the lifetime of a project. The proportion of engineering services and technology development that would be contracted out would depend on decisions as to the extent of its commitment to independent research and development activities. The Enterprise would still need to have a strong engineering capability (at the top level of management) not only for the planning of projects, but also for the supervision of contracts. Contract procurement procedures would need to be the best possible, in any event.

15. Enterprise operations may take various forms and there may be more than one operation under way at the same time involving the Enterprise to different degrees, with consequent effects on the scheduling or development of manpower resources. One reason to assume that the Enterprise may choose to become involved in more than one joint arrangement in the early years rather than opt for a fully integrated project at the start — apart from possible constraints of limited (and affordable) manpower resources<sup>7</sup> on an ac-

<sup>6</sup>The functions suggested by the informal composite negotiating text which could be categorized as permanent or ongoing are: preparation of annual reports, including audited statements of Enterprise accounts; preparation of summary statements of Enterprise position and profit-and-loss statements showing results of operations; determination of financial reserves and surpluses required; application for loans in capital markets and international financial institutions and determination of collateral or other security for borrowing; arrangements in connexion with the refundable paid-in-capital advanced by States; transference of income to the Authority; receipt of voluntary contributions from States; management of income from joint and other contractual arrangements and management of reserve and other funds; conduct or supervision of feasibility studies; planning of detailed project descriptions and analyses of estimated costs and benefits; preparation of draft plans of work and periodic provision of information and data on projects; procurement of goods and services under contracts, particularly consultancy services, and the acquisition and disposal of property; marketing studies and plans; evaluation of training needs and conduct of training. Functions in the area of transfer of technology, other than those that concern training, cannot necessarily be categorized as permanent.

<sup>7</sup>At the present time, at least, there are perhaps no more than a few hundred people with direct experience in the development of equipment and system design, and fewer still with operational experience (pilot-scale only). Most of these people have been drawn from the off-shore oil industry and the shipping and mining industries.

<sup>5</sup>Companies either ineligible or not interested in becoming members of major mining consortia may none the less develop some exploration and mining technology. Such companies could provide instrumentation or other services, or develop complete programmes, setting themselves up as consulting organizations to advise on the selection and assembly of an efficient mining system. Some may concentrate on providing "turnkey" processing operations, for example.

ceptable geographic basis — is the possibly uncertain situation as regards “appropriate technology, i.e., technology that would present the best option or route for the Enterprise to take. It may be questioned whether the Enterprise would want to be the recipient of mining technology in the initial years and invest the funds that may be called for. It may adopt a wait-and-see attitude in order to ensure that it is investing in mainstream or predominant technology and thus avoiding becoming a party to a competitive situation in technology development. While the competitive situation which has existed for some years between the developers of the continuous line bucket system and the developers of the hydraulic lift system may not persist up until the time the Enterprise faces its technological decisions, a dominant over-all system design may not have emerged. Unless the Enterprise were to develop its own technology at some point, it would also take into account the natural increase in competition among suppliers of technology and the emergence of a possibly more accessible market situation for mining technology.

16. The kinds of arrangements the Enterprise would consider may in fact be determined primarily by the need to build up its manpower capabilities. By entering into more than one arrangement with strong training components and allowing for increasing managerial responsibility in those arrangements,<sup>8</sup> the Enterprise would be ready after several years to undertake an integrated project with its own staff and using fully proven technology. An additional “training” component would lie in the arrangements made between the Authority and a contractor operating in the non-reserved area, although such arrangements might not always match sufficiently the priorities of the Enterprise of the time.

17. The necessity of adopting such a graduated approach to the development of manpower resources would be somewhat alleviated if personnel destined to become key staff of the Enterprise could become involved at the earliest possible stage in research and development work,<sup>9</sup> and thus bring to the Enterprise not only understanding of the available technologies but also the capability of refining and developing technology further. Unless such involvement were possible now or in the immediate future, it is unlikely that this approach would hold any more promise of achieving a fully integrated project at the earliest stage.

18. Another reason to expect that the Enterprise might undertake more than one project in the early stage concerns processing. It may be more attractive than mining to the Enterprise in terms of more readily available technology and manpower and because a processing plant could easily service more than one mining project. Processing technology would appear to call for less secrecy, thus fewer legal limitations on its transfer. The land-based processing plant, although original in concept, would probably consist of standard technologies (so that its capital and operating costs could probably be estimated with some confidence). It is even possible to say that operations will be standard to the mining industry as a whole, and that technical innovation would play a lesser role than in mining operations. There are at present a number of theoretical options for processing nodules (some dependent solely on what metal will be

<sup>8</sup>The training components would specify the results to be obtained, for example, by setting up a schedule requiring that a certain percentage of “counterpart staff” or “trainees” hold positions in each job category. A comparable method is the phase-out arrangement where management gradually changes hands, leaving some incentives for the partner in the venture to retain an interest, whether through profits earned or through a portion of the product which could be used for downstream processing operations.

<sup>9</sup>The Red Sea Commission, which is developing hydrothermal deposits, may be cited as such an example of industry co-operation for on-the-job training in research and development. Scientists and technicians from developing countries are trained on board research vessels in all aspects of the work.

primarily extracted), which may prove to be equivalent in terms of reliability. Considerations of labour, capitalization, and environmental protection may therefore determine the method finally adopted, and once that choice is made, an enterprise is committed to that metallurgical route.

19. Also worth noting is that the Enterprise would not be exclusively dependent for its processing technology on the same interests as would be involved in deep-sea mining. On the contrary, some of the most complex metallurgical operations in the world and some of the better equipped metallurgical research activities are located in developing countries. Training facilities for metallurgists also exist in the developing world, although the numbers trained do not meet the present requirements of the mining industries of developing countries. Training programmes related to the processing sector might be expected to have a somewhat different orientation and organization to the main training programmes relevant to deep-sea mining manpower requirements, many of which would be related to or actively linked with other marine education and training programmes. In the case of processing, the training link is clearly with existing mining industries. Moreover, if processing activities were located in developing countries there would be an understandable preference to process part of the raw product further in order to establish forward and backward linkages for employment and promote national industrial development. Training programmes in this context might be quite broad and would tend to concentrate on the nationals of the country concerned or on nationals of the region.

20. While experts disagree as to the seriousness of the constraints that may be imposed on the effective transfer of technology to the Enterprise, whether by provisions in existing contracts prohibiting companies from working for another sea-bed mining entity for the duration of their contract, by the difficulties of setting and justifying a fair price for technology, or by the limitations imposed by patent rights, non-disclosure and secrecy agreements, few experts disagree that the most serious constraint on the transfer of technology will be the availability of the managerial skills necessary to select technologies and put together and operate systems. At the same time, it should be noted that there are several levels of transfer, and therefore several levels of technological capability that the Enterprise may decide to aim for at different times or in different phases of operation, with consequent effects on training needs. These levels, or objectives, may be given, in descending order, as: developing the ability to evaluate and make decisions as to the overall feasibility and economic advantage of a project, and plan its development; developing the ability to design and modify equipment, and work with the supplier<sup>10</sup> to develop and further update the technology; developing the ability to design plant layout, order equipment, prepare production schedules and devise operating procedures; simply learning how to operate the equipment.

#### Manpower requirements with respect to the transfer of technology

21. The above comments are perhaps more relevant to the transfer-of-technology process as it relates to the Enterprise; certain other considerations would need to be taken into account where it is not the Enterprise which is the recipient, but developing countries. They may prefer to con-

<sup>10</sup>A common theme in the literature on transfer of technology is the importance of interplay between the supplier and the recipient of technology. Once technologies and systems are actually put to use, the equipment and procedures naturally become subject to modification over time, particularly in the early stages. The reason why many prefer the expression “technology development” to “transfer of technology” is presumably to emphasize this co-operative element to improve a system and at the same time improve the manpower capabilities.

centrate on technology transfer where skills can be acquired which can be used in other fields. The emphasis in many recent transfer-of-technology agreements has in fact been on skills that are transferable. It is worth noting in this context that, in many respects, little distinction can be drawn between sea-bed mining and continental shelf and off-shore operations.

22. A useful distinction may be drawn between transfer of technology in the context of the Enterprise — specific arrangements derived from the terms of contracts with operators in non-reserved areas and from the terms of joint ventures in the reserved areas—and transfer of technology of concern to the Authority and its member States—a much broader programme encompassing all the recognized elements of the transfer process. These are: training and fellowship programmes; information dissemination programmes, research programmes; and direct transfer programmes (where a developing country has entered into an arrangement on technology with an operator in the non-reserved area under the auspices of the Authority). Therefore, when dealing with the manpower requirements of the Authority proper with respect to the transfer of technology,<sup>11</sup> emphasis should also be placed on its work in information dissemination and research support, as well as in training.

23. The transfer-of-technology process calls for a broad range of knowledge and skills. Without attempting to allocate staff to the Enterprise or to offices of the Authority (or to indicate the extent to which members of the Legal and Technical Commission should be conversant with technology transfer questions or should advise on technology selection and terms), the required knowledge and experience would encompass the following legal, economic and technical fields:

- (a) International and national laws, regulations and practices, including registration, review and approval of agreements in the public or private sector;
- (b) Role of the patent system;
- (c) Role and activities of transnational corporations;
- (d) Financial costs of transfer, both nominal costs (payment for the right to use patents, know-how, etc.) and real costs (return on investment, technical assistance, management, etc.);
- (e) Evaluation and negotiation of contracts: all phases, from planning aspects, product specifications, plant design and construction, start-up phase, and engineering control, to product modification and development;
- (f) Informational aspects (documentation, instruction, organization of conferences and seminars, visits and exchanges of technical personnel, etc.);
- (g) Knowledge of the activities of United Nations organizations in the transfer of technology,<sup>12</sup> in the training of

<sup>11</sup> Transfer of technology, of course, is not a specific issue of the United Nations Conference on the Law of the Sea, but a general problem given high priority in the context of the new international economic order and in the programmes of various United Nations bodies and organizations, particularly the United Nations Conference on Trade and Development (UNCTAD), the United Nations Industrial Development Organization (UNIDO), the World Intellectual Property Organization (WIPO), and increasingly of other components of the United Nations system, such as the United Nations Conference on Science and Technology for Development and the United Nations Commission on International Trade Law (UNCITRAL). The responsibilities of the Authority in ensuring the effective transfer of knowledge, skills and technology relating to the development of deep-sea mineral resources might be expected to take account of objectives elaborated elsewhere and of existing programmes and experience gained in the establishment, expansion and modernization of the scientific and technical institutions and the capabilities of the developing countries.

<sup>12</sup> In view of the activities of UNCTAD, WIPO, UNIDO and UNCITRAL, there is also the possibility of their providing expert assistance in technology assessment and appropriate contractual terms.

qualified scientists, technologists and middle-level technicians and in the creation of the necessary international and regional information systems and data banks.

#### Requirements in legal fields

24. Again, without attempting to allocate legal staff to the Enterprise or to an office of the Authority (or to the membership of the Legal and Technical Commission), the knowledge and experience required in legal fields would cover the following:

- (a) Legal aspects of the transfer of technology (see para. 23 above);
- (b) Law of the sea;
- (c) Contractual law (joint arrangements, joint ventures, production sharing, etc., in mining and processing sectors) and international contracts (applicable law);
- (d) Corporate law (relevant national rules and regulations) and legal problems associated with transnational corporations;
- (e) Tax law and investment law;
- (f) Environmental law (international conventions and relevant national rules and regulations);
- (g) Consultancy contracts for feasibility studies, design and engineering and managerial services;
- (h) Commodity agreements and producers' associations;
- (i) National and international regulations affecting trade of commodities produced from the sea-bed (tariff and non-tariff barriers, restrictive business practices, preference systems);
- (j) Arbitration (international judicial proceedings and national enforcement of international decisions).

#### Requirements for environmental protection

25. Although knowledge of the potential environmental impacts associated with mining, transportation and processing of nodules is developing,<sup>13</sup> it will be difficult to forecast with any precision what the environmental effects will be. There is also some concern that failure to understand, anticipate, control or mitigate the potential adverse effects might delay and add to the total costs of the development of a sea-bed mining industry. Experts stress that studies of ambient environmental conditions and relevant physical and biological factors must be performed before large-scale mining commences in order to measure changes in the environment during mining operations. The point has also been made that a sound scientific basis for establishing and modifying future environmental regulations will help avoid legal difficulties arising from unsubstantiated "expert" opinions.

26. In 1975, a panel of experts<sup>14</sup> of the National Academy of Sciences (United States) set out a series of steps intended to provide the environmental protection necessary. In doing so, it also called attention to the need for industry to disclose

<sup>13</sup> Most of the investigation to date has been conducted through the DOMES project (Deep Ocean Mining Environmental Studies) undertaken under the auspices of the United States National Oceanic and Atmospheric Administration (NOAA). This project is designed to assess the potential environmental effects of at-sea nodule mining operations in the central Pacific nodule belt and to develop information for appropriate environmental safeguards. A complementary project, also conducted under the auspices of NOAA, will assess the environmental and socio-economic impacts of other activities associated with the development of the industry, specifically, ore (nodule) transportation, processing of nodules and disposal of process wastes.

<sup>14</sup> "Mining in the Outer Continental Shelf and in the Deep Ocean", report of the Panel on Operational Safety in Marine Mining (Washington, DC, National Academy of Sciences, 1975). These recommended procedures are also outlined in "Environmental Aspects of Manganese Nodule Mining", Anthony F. Amos and Oswald A. Roels, *Marine Policy* (April, 1977).

data on the technology of mining pertaining to those elements that interact directly with the environment, and for the research and other groups involved to receive and maintain any proprietary information under the terms of protective confidential disclosure arrangements that prevent public access to the data. The panel proposed:

(a) The establishment of environmental conditions in the potential mining areas. The necessary studies could be completed if necessary during subsequent phases of the procedure outlined;

(b) The environmental monitoring of pilot and/or full-scale mining operations;

(c) The documentation of changes induced in benthic and pelagic eco-systems by deep-sea mining and evaluation of their implications in relation to current and potential marine resources;

(d) If necessary, the recommendation of changes in mining methods and equipment use, based on the facts established in subparagraphs (b) and (c);

(e) Preparation of an environmental impact statement for mining;

(f) The formulation of environmental criteria and regulations for future mining operations to minimize harmful environmental effects;

(g) Evaluation of environmental impact reports submitted by mining companies in support of their applications;

(h) Preparation of the specific environmental impact statement for each project or plan of work;

(i) The monitoring and enforcement of regulations.

27. The main point to be made is that a series of basic and indispensable steps must be taken prior to the establishment of rules, regulations and procedures, that an extensive research and monitoring effort is required at the earliest possible stage, and that consideration should be given to the question of providing training in this context. The Authority's needs, in terms of both its staff and the Legal and Technical Commission members, may be quite considerable in the area of environmental protection. A preparatory commission would be the first to feel this need for information, data and expertise.

28. A thorough examination and discussion of the function, organization, staffing and personnel requirements of the Authority, with respect to its environmental protection responsibilities, may serve also to demonstrate in a concrete way the nature of the analysis that will have to be undertaken for each of the Authority's offices to create a data base upon which the question of training can be addressed.

29. Assuming that the environmental responsibilities and power of the Authority will be those set out in document A/CONF.62/WP.10/Rev.1, and that the initial set of environmental rules, regulations and procedures to be applied by the Authority will have been drafted by a preparatory body, an office of environmental policy and assessment might be structured and staffed as follows:

<sup>15</sup>It should be noted that, in accordance with article 162, paragraph 2 (y) and article 165, paragraphs 2 (c) and (d), the Council will direct and supervise a staff of inspectors through the members of the Legal and Technical Commission.

<sup>16</sup>Most United Nations organizations are engaged in collection, processing, analysis and dissemination of information relevant to their respective fields (as well as in training), and for some it is their principal task. The information is disseminated mainly through journals and reports or at professional meetings. A typical general information system is demonstrated by the ILO Integrated Scientific Information Service, which records all new acquisitions in the ILO library and distributes printed indexes to research institutes, libraries, government agencies, etc. Extensive abstracts in the technical training field are also published, containing summaries of published information on programmes, experience and experiments in the training of operative personnel, supervisors and technical staff.

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*Office of environmental policy and assessment*

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Director—Ph.D. in marine science with extensive administrative experience

Asst. Director—Responsible for co-ordination with UN system

*Reports reference and analysis division*

Director: B.S. level in marine science with concentration and experience in statistics and automatic data processing

2 Analysts: B.S. level in natural science, with concentration in statistics and automatic data processing

*Inspection and compliance division<sup>15</sup>*

Director: B.S. level in marine science, with administrative and related drafting experience

2 Inspectors: B.S. level in marine science

*Research division*

Director: Ph.D. marine science

2 Researchers: B.S. in marine science, with research and/or research contracting experience

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30. The above separation of functions into analysis, inspection and research would reflect a regulatory scheme whereby:

(a) A significant proportion of the detailed, on-site data and information would be supplied by the contractor, usually in the form of tapes recorded by automatic devices measuring volume, concentration and type of discharges and supplemented by measurements of physical, chemical and oceanographic parameters and samples of local biota. Authority staff would then analyse the reports and data received;

(b) Inspectors would make unannounced visits to mining vessels to ensure that environmental regulations were being complied with;

(c) Research work, particularly into baseline conditions and assessments of environmental results of sea-bed mining will be an essential addition to the work of the analysis section and to the work of the Legal and Technical Commission in keeping the applicable rules, regulations and procedures under review. Research work could be conducted by the Authority or conducted on its behalf by recognized institutions or through co-operative research programmes of the United Nations system.

#### General functions of the Authority's staff

31. One of the very first conceptions of the international machinery was of an organization which would exchange information and prepare studies (a common variety of secretariat function). The report of the Secretary-General to the Committee on the Peaceful Uses of the Sea-Bed and the Ocean Floor Beyond the Limits of National Jurisdiction, already mentioned, noted that while important functions in the subject area are performed by a number of United Nations organizations, particularly UNESCO/IOC (Intergovernmental Oceanographic Commission), the Intergovernmental Maritime Consultative Organization (IMCO) and the United Nations itself, the future Authority would act as a focal point for the assembly and dissemination of information<sup>16</sup> and the preparation of "reports, reviews, summaries and other working papers on national and international activities relating to the sea-bed, as well as on the relevant activities of the United Nations, the specialized agencies and other international bodies."



32. The Authority might be expected to have an active publications programme covering subjects of legal, economic, scientific and technical interest. Publications may represent the results of special meetings, conferences, expert groups, etc., the results of programmes in which the Authority is a participant or co-sponsor, and the results of "in-house" research and study.

33. Publications might also be expected to deal with aspects of education and training; for example, directories or registers of educational and training institutions and work on curriculum development.

34. The Authority will also have specific responsibilities with respect to the publishing of "boundary" data (article 134) and data concerning areas under prospecting and under exploration and exploitation.

#### Research support

35. The Authority will have extensive responsibilities with respect to the promotion of scientific research, including research in applied fields touching on technological development. It may have to formulate, participate in, organize or conduct, as appropriate, various research programmes, seminars, conferences, etc.; to disseminate the results of research sponsored or co-sponsored by the Authority; and prepare special studies and reports. This work clearly calls for active co-operation and co-ordination with United Nations specialized agencies and organizations and with the international scientific community.

36. Certain scientific questions will require intensive investigation; for example, the precise nature of the supply function for deep-sea mineral resources, and environmental aspects. Knowledge of the process of nodule formation, together with information on nodule grade, concentration and sea floor topography will be needed to estimate the existing reserves that are available for exploitation and to give an indication as to future supply. Investigation of environmental problems associated with mining and how to cope with them will be essential.

37. Almost all aspects of the Authority's work will require research input. It will need to measure impact on the markets for the several metals, to reduce uncertainty by determining the specific nature of cost and supply conditions in both the short and the long run, and to monitor profit margins in the industry. It may be noted that States also can be expected constantly to evaluate their stake in the economics of the deep-sea mining industry by investigating its impact on their development prospects. With respect to its resource policy, the Authority will need constantly to evaluate a variety of information and data on minerals production, reserves, markets, etc.

38. The Authority will also be expected to keep under review the general state of knowledge with respect to the deep sea, its resources and relevant technological developments.

#### Information services

39. Many of the general functions, as well as some highly technical functions, indicate the need for an extensive information service, including library and archives, and since much of the information the Authority will use or disseminate would be stored on computer, the Authority faces an extensive requirement for specialized information personnel.<sup>17</sup>

<sup>17</sup>United Nations organizations have recognized the need in connexion with the extension of data banks and technological information exchange systems and are consequently strengthening training programmes for specialized information personnel. There will also be a substantial requirement for personnel with experience in statistics and automatic data processing.

40. Technological information stored and disseminated by the Authority would cover available technology<sup>18</sup>—licensing conditions, raw materials processes, know-how, machinery and equipment, operation procedures, maintenance and industrial engineering. It would also cover the commercial, economic and legal aspects — plant and operating costs, transfer of technology agreements and their terms, data on relevant transactions between developed and developing countries, including operations of transnational corporations — and information on environmental aspects. The Authority's information services should preferably also encompass consultants and experts, research and development institutions (programmes and results), engineering services, etc. and training programmes.<sup>19</sup>

41. The Authority would also be expected to collect all nodule analyses carried out by industrial, academic or governmental laboratories and to maintain an extensive collection of geological and oceanographic charts. Sea-bed maps will be essential both to the scientific research responsibilities of the Authority and to the assessment of data presented by potential contractors. While the Authority is unlikely to operate its own specialized printing plant or to contract such services, its responsibilities for maintaining an extensive library and map distribution service point to the need for substantial manpower requirements in this area.

#### Existing training

42. Educational institutions, materials and curricula with an orientation or specialization in marine mining are at the same early stage of development as the industry itself. The engineers and technicians currently engaged in the development of the future industry have been trained in other areas and have simply extended their earlier training and experience to meet marine mining demands. They have, in effect, undergone on-the-job training. While this movement can be expected to continue to account for many personnel involved in the industry, eventually the demands may require that the full educational spectrum be considered, and that training be offered at operational levels for specialists in the professional category, technicians, equipment operators and supervisory managers and that a marine orientation be adopted from the earliest educational stages.

43. In the present early stage of development, marine mining must draw upon existing educational processes and institutions in the fields of ocean science and engineering, mining, off-shore petroleum production, mineral exploitation, environmental and resources sciences, economics, marine affairs, and admiralty and international law. The disciplines of importance are covered to some extent in many institutions and, more comprehensively, in those institutions which offer interdisciplinary courses and research opportunities. The majority, however, do not have marine-oriented courses. The net result is that scientists engaged in marine minerals exploration and engineers working in marine mining development require on-the-job education in ocean-related problems. Their "training" needs to cover ex-

<sup>18</sup>Information of a proprietary nature would, of course, be subject to special arrangements.

<sup>19</sup>No comprehensive transfer mechanism for information on marine technology has been established within an international organization (although the programmes of United Nations/OETO (Ocean Economics and Technology Office) have been expanded in recent years). The largest effort undertaken jointly by United Nations, FAO/IOC is the Aquatic Sciences and Fisheries Information System (ASFIS). ASFIS has been designated as an international information system for the science and technology of marine and fresh water environments, and is being transformed into a computer-oriented system. The components of particular interest in this context are its Register of Experts and Institutions and Register of Meetings. The second Register of Courses and Training Programmes in Marine Affairs, to be prepared also by United Nations/OETO, will be incorporated into ASFIS.



ploration, mining systems, ore processing and mineral economics in order to develop the necessary professional background; mathematics, physics and chemistry are also required. The most direct and applicable education in academic institutions is therefore obtained by those who serve as laboratory and shipboard assistants in ongoing research projects having a bearing on marine mining. Such opportunities are few for the present.

44. The technician training required to operate underwater cameras and television equipment, mining machinery, instruments for nodule analysis, environmental monitoring equipment, deck machinery, pumps, winches and pipeline, as well as to carry out the normal duties of seamanship, also needs to be made more effective by further input from industrial and academic sectors.

45. A 1975 panel report of the National Academy of Sciences recommended that government-sponsored academic research and training in selected aspects of sea-bed minerals exploration, marine mining research and development, and environmental considerations be strengthened in co-operation with the academic and industrial sectors. It considered that expanded research support would provide the technological and scientific results and the specialized manpower needed to meet early industrial and regulatory needs.<sup>20</sup> The panel of experts also suggested that some curriculum development programmes might usefully be introduced with the support of appropriate governmental agencies, and that such programmes should recognize that marine education refers not only to the motivation, training and education of marine specialists, but to an informed public sufficiently aware of the importance of the oceans and marine environment to take part in or influence national marine policy.

46. Any useful assessment of existing training opportunities provided through multilateral or bilateral channels requires extensive investigation, and the co-operation of all elements of the United Nations system, Governments and public and private institutions.

#### Some preliminary guidelines for the establishment of a training programme

47. In order to facilitate the assessment of existing training opportunities and the subsequent development of special courses and curricula, the following guidelines are suggested:

(a) The programme should recognize three kinds of formalized international training programme: academic courses; short, comprehensive, group-oriented courses; and training concentrated on an individual and his speciality. It should also recognize on-the-job experience, academic training leading to a degree in a traditional discipline and regional and topical conferences and seminars, in order to provide the necessary diversity in structure, scope, approach, duration and focus. The programme should take account also of national needs and desires, although it would be intended basically to promote participation in activities at the regional and international levels;

(b) The programme should offer both theoretical and practical training and might be conducted at university institutions, in scientific laboratories and in public and private institutions specializing in research, exploration and exploitation activities, as well as through operations in the international area. Practical and project-oriented courses should,

preferably, begin after the completion of more theoretical courses;

(c) The programme should, at least for some time, give priority to the training of scientists and engineers, particularly as a means of gaining more managerial experience and bringing job requirements into perspective, recognizing, however, that managers cannot be produced by a short (or long) training course and a few years' experience, but by many years of on-the-job experience. Participants should therefore be expected to have a basic and broad background in ocean sciences (with emphasis on applied as opposed to continued interest in basic research), or engineering, and preferably some experience in related fields (whether in off-shore mining or land mining operations);

(d) The programme should promote and possibly also provide active support to basic education in the marine sciences, primarily through UNESCO/IOC, and its training, education and mutual assistance programme in marine sciences;

(e) No attempt should normally be made to train an individual in all fields of sea-bed mineral exploration and exploitation; rather, emphasis should be placed on training in selected fields, and building on the capabilities of the individual;

(f) Some resources should also be devoted to the training of technicians and skilled or semi-skilled workers to provide adequate support to the professionals who would be the main focus of the programme. Included in this category would be data gatherers and processors, equipment operators, including drillers and mechanics;

(g) The programme should train technicians only in those areas where continuous employment could be reasonably assured (particular attention would be paid to this aspect in the early years because of a more rapid rate of innovation in exploration and exploitation technology);

(h) Candidates should be selected on a regional basis (rather than on a basis of equitable geographic distribution),<sup>21</sup> also taking into account the status or possibility of development or of participation in sea-bed mining or processing operations, and the interests of the land-locked and geographically disadvantaged States;

(i) The programme should be based on a "clear understanding" that personnel selected for training by or through the programme would be accommodated either in the educational system, the relevant part of the private sector, in Government or in the Authority/Enterprise;

(j) On-the-job training components would ensure to the extent possible that personnel were given some responsibility for operations;

(k) The programme should concentrate on involving to the extent possible the scientific, educational and multinational business communities. (The weakness of present United Nations system activities relating to the expansion of marine transfer of technology is insufficient involvement by non-States. More research will be needed to map the complex network of non-governmental activity that already exists in the marine field);

(l) The programme should be implemented at national, bilateral, regional and global levels, taking account of the prevailing trend that international organizations decentralize their activities as much as possible and delegate responsibilities to the regional and subregional levels, and of the objectives for the development of regional centres outlined in part XIV of the informal composite negotiating text. In

<sup>20</sup>See foot-note 14. That panel also recommended that a study be undertaken on existing and projected personnel requirements of the marine mining industry, including those associated needs of regulatory agencies and academic institutions, in order to provide long-range educational guidance. Unfortunately, such a study did not eventuate.

<sup>21</sup>In any training programme it would need to be recognized that expertise could not be built on a national basis since the numbers required to build the infrastructure would be beyond the scope of any training programme.

particular, the programme should complement regional efforts to build capabilities in information exchange, transfer and development of technology, and to pool financial resources, skilled manpower and training resources.<sup>22</sup> The programme might single out a few promising institutions and help develop them into "centres of excellence" (which could be regional centres) and should also promote joint projects or "sister institutions" agreements between developed and developing country institutions, since such links provide the important elements of continuity, communication, joint research, quality control, etc.;

(m) Since the programme would consist of many elements, a considerable proportion of available resources should be devoted to over-all co-ordination. Co-ordination could be achieved through the development of a common register of programmes and institutions (also serving to help identify sponsors and appropriate means of finance); common training manuals and exchange of text materials; visiting lecturers; co-ordination of information, review and supervisory activities, etc.

#### Methods for establishing programmes

48. It may be useful also to consider ways in which training programmes have been formulated and developed in the past.

49. One common method has been to establish an expert or study group, or workshop, for the purposes of identifying needs, establishing methods, and co-ordinating existing programmes. A particularly relevant example is found in the method used for the preparation of a 1968 report, "Marine science and technology: survey and proposals",<sup>23</sup> presented also to the Sea-Bed Committee. That report surveyed actual activities in marine science and technology at national and international levels and sought to determine the world-wide status of trained personnel before making its recommendations. To do this, a group of experts was set up to assist the Secretary-General. That group was headed by a special consultant appointed by the Secretary-General and consisted of 4 specialists from the United Nations, 16 experts nominated by specialized agencies and United Nations organizations, and 11 national experts participating in their private capacity. The group met twice. The first meeting outlined the scope of the survey and ways and means of obtaining the required information. This was followed by a note verbale with questionnaire to all States and organizations members of the United Nations system.

50. Another example can be found in the United Nations University programme on the use and management of natural resources and its efforts to provide internationally co-ordinated advanced practical training to strengthen scientific resources in developing countries. A workshop was held in Iceland by the United Nations University and the Government of Iceland in order to establish training needs in the field of geothermal energy.<sup>24</sup> In fact, the practice of using

<sup>22</sup>National training need not, or cannot, assume the permanent demand for the services of personnel in the capacity for which they were trained. With a regional centre for education, training and research, a pool of trained manpower is created from which a country can draw. Regional centres can also identify areas of training in the context of the job market and make the necessary recommendations for adjustments to problems and trends.

<sup>23</sup>E/4487 and Corr.1-6 and E/4487/Add.1.

<sup>24</sup>The Government of Iceland proposed to conduct, with United Nations University support, an advanced practical training in geothermal energy for persons from developing countries. The objective of the workshop was to determine the need for such a training course and then to ensure that the course proposed would not duplicate any other course. The workshop was made up of experts in the field who were knowledgeable about current training facilities and development activities, individuals from selected developing countries that have geothermal energy resources and representatives of United Nations agencies that sponsor training courses in the subject area.

study groups or special conferences to establish education and training needs, or to plan, develop or evaluate programmes, is quite common in the United Nations system. Some organizations use a permanent device, for example, the World Health Organization Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel.

51. Another method for the co-ordination of existing training programmes and recommendation of new and modified programmes is to create international studies boards which provide the necessary forum for information exchange on existing programmes, assess both the need for training and the suitability of candidates selected for training<sup>25</sup> and later provide the necessary feedback on the effectiveness of intensive or specialized training. Such boards also help to ensure that candidates from recipient countries are informed about all the courses and can apply for those most suitable; that training courses for technicians and skilled workers are made available, or the need for such courses is made known to the appropriate agencies, Governments and interested institutions; that suitable training manuals are prepared; and that there are exchanges of text materials, lecturers and students.

52. Whatever method might be adopted, the experts involved could also be expected to contribute to evaluation and planning activities with respect to the Enterprise's manpower requirements and to the development of more formal training programmes conducted finally under the auspices of the Authority. That programme may in time incorporate an international training institute as part of the Authority.

#### Training institute of the Authority

53. This suggestion is largely prompted by the probable need to distinguish between the three categories of training which emerge from an examination of the informal composite negotiating text, namely, training through the Enterprise, training through the contractor and training through the Authority proper. Training in the first two instances would presumably emphasize engineering skills, some areas of marine science, and management experience. Training through the Authority would be expected to encompass a wide variety of disciplines including environmental science and regulations, mining economics and various types of legal knowledge and expertise. The negotiating text also raises questions as to co-ordination among these three avenues for training. It is not clear what role, for example, the Enterprise will play in determining the obligations of the contractor with respect to training; nor is it clear what distinction will be made between training as a component of Enterprise operations and training provided to interested developing country personnel not associated with Enterprise operations. The process of establishing rules, regulations and procedures with respect to training, in accordance with article 16 of annex II (which refers to article 144) may shed some light on this matter.

54. One way to fuse or, at least, co-ordinate training opportunities would be to create a training institute in the Authority with the capacity to provide both general orientation and specialized training, whether for staff<sup>26</sup> of the Authority and Enterprise, trainees associated with Enterprise opera-

<sup>25</sup>Prospective trainees are sometimes interviewed in their home countries and a report is then made available to interested universities and institutions.

<sup>26</sup>It should be noted that the informal composite negotiating text, in most cases, uses the wording "staff of the Authority and Enterprise" when referring to training, so that the impression may be given that only personnel (permanent or under temporary contract) would be eligible for training associated with exploration and exploitation. There would seem to be no room in such a formulation for persons selected by the Authority for training under fellowship schemes, for example.

tions, or personnel from member States, particularly from developing countries.

55. The training responsibilities of the contractor could be largely or exclusively fulfilled through an institute, giving the Enterprise the opportunity of indicating its needs and the institute the responsibility of co-ordinating the training programmes offered by the contractor with those of the Enterprise.

56. The institute could also become involved in certain research activities and in information exchange to the extent that training relates to such activities. Its information responsibilities might also encompass such activities as the development of marine-oriented curricula and registers of appropriate institutions, in co-operation with similar programmes presently undertaken in the United Nations system.

57. There are a number of training institutes of various kinds in the United Nations system ranging from the United Nations University and the United Nations Institute for Training and Research to the International Labour Organisation training centre at Turin and to training institutes sponsored or co-sponsored by members of the United Nations system. The structure and mandate of such institutes may be usefully examined as well as the steps taken for their establishment. Particular attention would also need to be given in this exercise to the regional centres that may be established

in conformity with the provisions of the informal composite negotiating text and their working relationship with such a training institute.

#### **Implications of an assessment of training needs, existing opportunities and programme development needs**

58. Mentioned frequently in this paper are the functions of the Authority with respect to training, whereas the request of the Chairman of the First Committee and the subsequent suggestion of the delegation of the United Kingdom to establish a voluntary fund for training relate to the period prior to the entry into force of the convention, thus presupposing a training programme initiated and supported by the United Nations itself. Reference must be made, consequently, to the mandate given in General Assembly resolution 3067 (XXVII) which established a secretariat to service the Conference on the Law of the Sea. The secretariat has drawn extensively on the expertise available in other offices of the United Nations. However, in the case of the present request, wide co-operation will be required from many components of the United Nations system, from other intergovernmental organizations, from Governments and from national and regional institutions, in order to collect and evaluate the information required and to formulate and implement a programme. Such an undertaking would carry financial implications from the initial stage.

#### DOCUMENT A/CONF.62/83

Note dated 20 August 1979 from the International Labour Organisation\*

[Original: English]  
[20 August 1979]

1. The first revised version of the informal composite negotiating text of the Third United Nations Conference on the Law of the Sea (A/CONF.62/WP.10/Rev.1) envisages the establishment of the International Sea-Bed Authority and its Enterprise which will be responsible for exploration, exploitation, transport, processing and marketing of the mineral resources of the sea-bed. The activities of this Authority shall be carried out by its Enterprise and/or by member States or nationals or other legal entities within member States.

2. When the activities are carried out by member States (or their nationals or legal entities), the labour law applying to the personnel employed by them will presumably be that of the State of the flag flown by the ships, vehicles and installations in which they are working. However, as regards ships, vehicles and installations belonging to the Authority or its Enterprise (or in any case not under a national flag), the labour and social conditions, as well as the safety standards, applicable to the personnel employed are not governed by any provisions of the negotiating text. Without excluding the possibility that the personnel working in ships, vehicles and installations operating under a national flag be covered by general uniform provisions, it seems that, as far as the personnel working under the flag of the Authority are concerned, there is a lacuna in the text which should be filled.

3. This point has already been raised by the Portuguese delegation and others, and it is suggested that some provisions could be included in the text drawing attention to the

need for regulations (if the Authority will have the power to create a system of laws and regulations), or standard employment contracts (if it is envisaged that there will be such contracts creating a legal framework), which would take into account the relevant conventions and recommendations of the International Labour Organisation (ILO).

4. It is recalled that ILO conventions and recommendations are adopted, with a two-thirds majority, by the International Labour Conference, at which each country is represented by two government representatives, one employer representative and one worker representative. The adoption of the convention is preceded by a long consultation procedure and a double discussion at two different sessions of the Conference. Therefore, while conventions are legally binding only upon ratifying States and recommendations are always advisory, the manner of their framing gives them an international moral authority appropriate to inspire the determination of the labour and social conditions of the personnel employed by the Authority or the Enterprise.

5. The International Labour Office is studying the existing international labour conventions, with a view to determining which ones could be considered both relevant and applicable to "off-shore" installations. From the studies so far made, it would appear that problems of safety and health, conditions of work (hours of work, minimum age, night work, holidays with pay), migrant workers, freedom of association, the right to organize and the right to collective bargaining, discrimination in employment and occupation, minimum standards in merchant shipping, social security and training could be covered by provisions inspired by ILO conventions. ILO is available to help in drafting such provisions.

\* Circulated at the request of the International Labour Organisation.