

**The new order in
the world's oceans and
seas and the activities
of the registered
pioneer investors**

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The seas cover approximately 71% of our planet and about half of this area is over 3800 m deep. Thus nearly 50% of the Earth's surface is covered by oceans deeper than 3000 m (Thiel *et al.*, 1992). Much of this area lies outside the jurisdiction of any individual nation. During the last 20 years, it has become one of the main strategic and geopolitical concerns of highly developed countries, most of which are aiming to obtain priority in managing the rich deposits of mineral resources on the sea-bed.

On 1 November 1967, in a speech to the United Nations General Assembly, Malta's UN Ambassador, Arvid Pardo, asked his listeners to look around them and open their eyes to a looming conflict that could devastate the oceans, the lifeline of man's very survival. Pardo ended with a call for 'an effective international regime over the sea-bed and the ocean floor beyond a clearly defined national jurisdiction'. He went on: 'It is the only alternative by which we can hope to avoid the escalating tension that will be inevitable if the present situation is allowed to continue'.

The Third United Nations Conference on the Law of the Sea was convened in New York in 1973. It ended nine years later with the adoption of a constitution for the seas – the 1982 United Nations Convention on the Law of the Sea. Twelve years have since elapsed. Every passing year significant steps and important measures have been and are being taken by States as they implement the provisions of the Convention. This lays down a comprehensive programme of law and order in the world's oceans and seas, providing the legal framework and detailed rules governing all uses of oceans and access to their resources.

16 November 1994 is of great historical importance. It means, hopefully, the beginning of a new order on the oceans and seas, which would have a real chance of achieving the most universal character possible in the light of the United Nations Convention on the Law of the Sea. It came into force with the Implementation Agreement relating to part XI of this Convention. In accordance with this Convention, the areas of sea-bed and ocean floor and the subsoil thereof beyond the limits of national jurisdiction as well as

their resources are **the common heritage of mankind**, the exploration and exploitation of which shall be carried out for the benefit of mankind as a whole, irrespective of the geographical location of States. As a result of a wide-ranging compromise, the Convention has required substantial sacrifices by many states. This Convention also has a very important legal and political value for registered pioneer investors and their certifying states involved in activities in their reserved Sea-Bed Area.

Registered pioneer investors

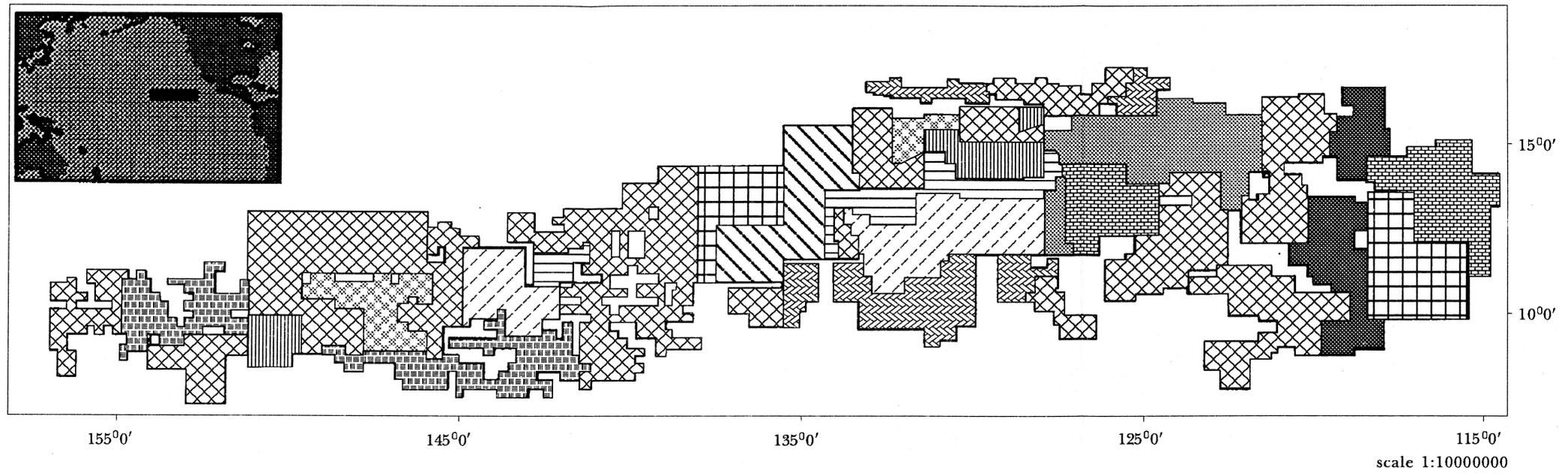
In 1987, a historical decision was taken by the General Committee of the Preparatory Commission for the International Sea-Bed Authority and for the International Tribunal for the Law of the Sea (the PrepCom) in accordance with United Nations Convention on the Law of the Sea and Resolution II.

That year was marked by a series of very important events in the development of a new legal order for the ocean, particularly in relation to the international sea-bed area and the exploration and exploitation of the deep sea-bed:

- the last conflicts with respect to overlapping claims were resolved by means of an agreement signed on 14 August, clearing the way for the registration of pioneer investors,
- on 17 August, the Government of India was registered as the first pioneer investor,
- on 17 December, the Governments of France, Japan and the USSR were also registered as pioneer investors.

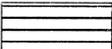
Resolution II of the Third United Nations Conference on the Law of the Sea identified four States – India, France, Japan and the Union of Soviet Socialist Republics – and four multinational consortia, composed of companies from Belgium, Canada, the Federal Republic of Germany, Italy, Japan, the Netherlands, the United Kingdom of Great Britain and Northern Ireland, and the United States of America, as pioneer investors having the right to register their claims to pioneer areas with the Preparatory Commission.

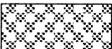
The General Committee of the PrepCom, pursuant to resolution II of the Third United Nations Conference on the Law of the Sea, considered the application submitted by the Government of the People's Republic of China, and on 7 March 1991 (doc. LOS/PCN/117) registered the China Ocean Mineral Resources Research and Development Association (COMRA) as a pioneer investor, allocating to them a pioneer area in the Clarion-Cliperton Zone. The next decision of the PrepCom General Committee, contained in document LOS/PCN/L.122 dated 22 August 1992, approved the



 Pioneer areas of the International Sea-Bed Authority

Pioneer areas of the registered pioneer investors

 Russia (Yuzhmorgeologiya)

 Japan (DORD)

 France (IFREMER/AFERNOD)

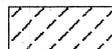
 China (COMRA)

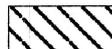
 Interoceanmetal Joint Organization (IOM)

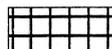
 Korea (KORDI)

Areas claimed by consortia

 OMA (Ocean Mining Associates Consortium)

 OMCO (Ocean Minerals Co. Consortium)

 OMI-I (Ocean Management Inc. Consortium)

 OMI-II (Ocean Management Inc. Consortium)

 KCon (Kennecott Consortium)

Fig. 1. Mercator Projection AT N25. Disposition of sectors of registered pioneer areas in the Clarion-Clipperton Fracture Zone in the Pacific Ocean

Interoceanmetal Joint Organization, which was also registered as a pioneer investor. The fact of registration gave this organization the exclusive right to carry out pioneer activities in its pioneer area in the Clarion-Clipperton Zone in accordance with resolution II of the Third United Nations Conference.

At the latest, 12th session of the PrepCom in August 1994 the Government of the Republic of Korea was registered as a pioneer investor (doc. LOS/PCN/L.115, 11 August 1994); it too registered a pioneer area in the Clarion-Clipperton Fracture Zone. This zone also includes the pioneer areas of other, previously registered investors, namely: France, Japan, the Russian Federation, OMA, OMCO, OMI and KCon, China and Interoceanmetal (Fig. 1).

France – AFERNOD

The French interest in ocean mining can be traced to 1969, when the Centre National pour l'Exploitation des Océans (CNEXO) turned its attention to nodule investigations in the French Polynesian area. In 1970 Société Le Nickel (SLN), and CNEXO (now IFREMER) joined forces to study the feasibility of mining polymetallic nodule deposits in the oceans (Lenoble, 1990).

In 1974 they formed a joint-venture with CEA and NORMED, which under French law is known as the AFERNOD consortium (Lenoble, 1990).

In 1987 IFREMER, on behalf of AFERNOD, obtained a pioneer area in the North Pacific's CCFZ consisting of three segments totalling 75000 sq. km.

Japan – Deep Ocean Resources Development Co., Ltd. (DORD)

Since 1975, the Japanese Ministry of International Trade and Industry (MITI) has been carrying out prospecting activities for marine mineral resources through its subsidiary organization, the Metal Mining Agency of Japan (MMAJ).

In 1982 the DORD was formed as a national consortium. It is a group of 61 Japanese organizations, 49 of which are 'DORD' participants (Lenoble, 1990).

On behalf of Japan, DORD has registered as a 'pioneer investor' and in 1987 received mining rights to about 75000 sq. km spread over two areas in the CCFZ. Japanese firms are also members of the OMI and KCon.

Russia – Yuzhmorgeologiya

Russian interest in nodules can be traced to academic research cruises during the 1960s.

The Yuzhmorgeologiya organization operates the Russian nodule mining programme and is a state enterprise based in Gelendzik. This group has conducted exploration and prospecting activities in its own pioneer area since 1980 (Thiel *et al.*, 1992).

The Russian Federation, a certifying state of the Yuzhmorgeologiya, has registered as a 'pioneer investor' and has obtained mining rights for two separate areas within the North Pacific CCFZ totalling about 75 000 sq. km.

India – National Institute of Oceanography (NIO), Department of Ocean Development (DOD)

The Indian government has sponsored research on nodule deposits in the Indian Ocean since 1977 (Thiel *et al.*, 1992).

India applied to be a 'pioneer investor' under the UN legal regime and in 1987 was the first nation to be granted a 'pioneer area', having been allotted a 150 000 sq. km portion of a 300 000 sq. km region located in the Indian Ocean. In accordance with the provisions of resolution II, the remaining 150 000 sq. km were set aside for use by the International Sea-Bed Authority, which began activities on 16 November 1994.

China (COMRA)

On behalf of the People's Republic of China, the China Ocean Mineral Resources and Development Association (COMRA) applied to register its pioneer area in the western part of the Clarion-Clipperton zone, a total of 150 000 km².

COMRA spent more than 60 million US dollars on exploring over 2 million square kilometers in order to delineate its area (Lenoble, 1990).

The Kennecott Consortium (KCon)

In January 1974, Kennecott formed a consortium which included Noranda Mines Ltd. of Canada, Mitsubishi Corp. of Japan, as well as Rio Tinto Zinc. Inc. and Consolidated Gold Fields, both of the United Kingdom (UK). The group carried out additional mining technology development, including shallow and deep water tests of systems and system components, but never brought nodules to the surface in a pre-pilot mining test (PPMT) mode (Lenoble, 1990).

This consortium is still carrying out its activities, but at a very low pace owing to the economic situation. In 1984 the group obtained an exploration licence to a prime portion of the CCFZ from NOAA (USA-4, about 65 000 km²) and holds a licence to another area at the far-eastern end of the CCFZ under the UK legal regime (Thiel *et al.*, 1992).

The Deepsea Ventures Inc./Ocean Mining Associates Consortium (OMA)

In October 1974 the OMA consortium was formed, which originally included DVI (a subsidiary of Tenneco Corp.), Essex Iron Co. (a subsidiary of the US Steel Corp.), Union Mines Inc. (later replaced by Union Seas Inc., both subsidiaries of Union Minière S.A. of Belgium), and the Japan Manganese Nodule Development Co. (JAMCO) – a group of Japanese firms. In November 1974, the consortium made a formal application for a claim with the US State Department to approximately 60 000 km² of seafloor in the CCEZ (Deepsea Ventures, Inc. 1974).

The Ocean Management Inc. Consortium (OMI)

The OMI consortium was formed in May 1975 and originally consisted of INCO, Arbeitsgemeinschaft meerestechnisch gewinnbarer Rohstoffe (AMR), and an association of about two dozen Japanese firms grouped together under the name of Deep Ocean Mining Company (DOMCO), led by members of the Sumitomo Group. The American firm SEDCO (Southeastern Commonwealth Drilling Co.) also joined the OMI consortium group (Lenoble, 1990). OMI was the first consortium to successfully recover nodules from the abyssal depths of the Pacific Ocean during PPMTs using the converted drillship SEDCO-445 in March 1978 (Thiel *et al.*, 1992).

The Ocean Minerals Co. Consortium (OMCO)

The OMCO consortium was formed in November 1977, and originally consisted of the US firms LMSC, AMOCO Ocean Minerals Co. (a subsidiary of Standard Oil of Indiana) and Lockheed Systems Co. (another subsidiary of Lockheed Corp.), as well as two Dutch companies, Billiton B. V. (a subsidiary of the Royal Dutch/Shell Group) and BKW Ocean Minerals (a subsidiary of the Royal Bas Kalis Westminster Group N. V.) (Lenoble, 1990).

OMCO is currently a national consortium made up of three US firms, the two companies from the Netherlands having withdrawn in 1986. The OMCO group was also granted an exploration licence by NOAA in 1984 (USA-1, about 168 800 km²) (Thiel *et al.*, 1992).

Arbeitsgemeinschaft meerestechnisch gewinnbarer Rohstoffe (AMR)

In 1972, the German national AMR consortium was formed by Metallgesellschaft AG, Preussag AG and Salzgitter AG, to be joined by Rheinische

Braunkohlen-Werke AG in 1973. The group carried out extensive reconnaissance and exploration activities in the Pacific and Indian Oceans.

AMR currently consists of the founder members Preussag AG and Metallgesellschaft AG. As participants in OMI, the group has an interest in an area within the CCFZ for which NOAA issued an exploration licence (USA-2) in 1984. AMR also has an interest in three other license areas claimed under the German legal regime: two are in the CCFZ, while the third is located in the south Pacific Ocean's Peru and Bauer Basins (Thiel *et al.*, 1992).

Interoceanmetal Joint Organization (IOM)

The Interoceanmetal Joint Organization, based on an Intergovernmental Agreement, was established on 27 April 1987 and became active in December 1987 (Kotliński, 1992).

In order to coordinate the exploration and exploitation of polymetallic nodules, the IOM has developed new, high-technological methods for deep sea-bed mining and has thereby made a contribution to mankind for the exploitation and utilization of these resources. The principal organ of the IOM is the Intergovernmental Council, consisting of all the official governmental representatives of the certifying states (Republic of Bulgaria, Republic of Cuba, Republic of Poland, the Russian Federation, the Czech Republic and the Slovak Republic). The Council meets twice a year and has the power to establish general policies in conformity with the relevant provisions of the Statutes and Agreement of the IOM. The Supervisory Commission is the controlling organ of the Council, while the executive organ of the Council is the Directorate, which includes the Director General and his Deputy. The IOM consists of 2 departments. One deals with geological and ecological surveying for exploration and exploitation, the other covers planning, financing, management and economic surveys.

The IOM's range of activity has been established by several documents:

- the regulations of the United Nations Convention on the Law of the Sea (The Law of the Sea..., 1983),
- the regulations of Resolution II and documents of the Preparatory Commission for the International Sea-Bed Authority and for the International Tribunal for the Law of the Sea (Law of the Sea ..., 1994).

The IOM's main objective is to carry out pioneer activity in its pioneer area. The aim of the exploration of polymetallic nodules is to prepare these mineral resources for exploitation.

Polymetallic nodule deposits on the deep-sea floor are found at an average water depth of 4000–6000 m in many parts of the World Ocean, but at

present it is clear that extended nodule fields of commercial interest with the requisite grade of Ni + Cu + Co and abundance are located only in some oceanic basins:

1. Pacific Ocean:

- Clarion-Clipperton Fracture Zone (CCFZ),
- Peru-Basin.

2. Indian Ocean:

- Central Indian Basin.

The Clarion-Clipperton Zone is the most interesting from the economic point of view (Amann, 1992; Lorenc and Kotliński, 1994). In this area of about 2.0 million sq. km between Hawaii and Mexico more than 20 billion tons of nodules have been estimated to occur, 5 billion tons of which could possibly be exploited. They show very good metal assays: about 30% manganese, 1.3% nickel, 1.2% copper, 0.2% cobalt and varying amounts of other elements.

For some years — 1988–1989 — the IOM concentrated mainly on carrying out regional geological and geophysical investigations in the Clarion-Clipperton Fracture Zone of the Pacific Ocean (Kotliński, 1993).

The application area of the IOM, covering 300 000 sq. km, was delineated within a total exploration area of 540 000 sq. km and is located in the eastern part of the Clarion-Clipperton Fracture Zone (CCFZ). Stretching WSW–ENE, it is bounded by the Clarion Fracture Zone to the north, the application areas of the Authority and OMA to the west, the application areas of the KCon and OMI to the east, and the Clipperton Fracture Zone to the south. The pioneer area covers a total of 150 000 sq. km and is composed of sectors B₁, B₂ and B₃. This pioneer area does not overlap those of KCon, OMI, OMA and the International Sea-Bed Authority (the Authority) (Kotliński, 1992).

The General Committee of the PrepCom decided to register the IOM as a pioneer investor on the basis of motions from the PrepCom Group of Technical Experts included in application LOS/PCN/BUR/INF/R.8 dated 2 August 1991 and based on application LOS/PCN/BUR/INF/R.11, published by the IOM, which followed the first-mentioned application and a detailed examination of the results of geological surveys.

On 30 July 1992 the Secretary General of the United Nations Organization issued a Certificate of Registration to the IOM as a pioneer investor and its certifying states.

The most important question for the IOM as a registered pioneer investor and the certifying states at the summer meeting of the PrepCom on 18 August 1992 was approval by the PrepCom General Committee of the Understanding on the fulfilment of obligations (doc. LOS/PCN/L.108 Annex). In accordance with the Understanding which applies to the IOM; this organization shall provide training pursuant to paragraph 12 (a) (ii) of resolution II. The first group of trainees shall consist of four individuals, selected by the Training Panel of the PrepCom. A substantial component of the training programme should involve training in the use of all available technology. On behalf of the certifying states, the IOM also agrees to provide annual reports to the Commission on its pioneer activity. The IOM will undertake, if requested by the PrepCom, a programme of exploration in accordance with the provisions of paragraph 12 (a) (i) of resolution II, of one mine site for Enterprise in the area designated as the reserved area for the conduct of activities by the Authority. The IOM also agreed to provide, on the basis of the available data collected by it in the area reserved for the Authority, the computerized data base disks for samples, including:

- (i) the establishment of comprehensive computerized data base disks for sample stations,
- (ii) data on station number, coordinates, depth, abundance, metal content, devices and information on the source of the data, allowing the raw data to be statistically processed and presented by various types of maps and graphs.

During the next meeting of the PrepCom on 9 February 1993, the training programme submitted by the IOM and its certifying States (doc. LOS/PCN/1993/CRP.12) was adopted by the General Committee of the PrepCom. On the basis of the scientific and technological potential and experience of the IOM and its certifying States, this programme has drawn up priority disciplines offered to trainees, who should be nominated by their Governments, selected by the Training Panel and confirmed by the PrepCom. Following its adoption by the General Committee of the PrepCom, the training programme will enable trainees to acquire the necessary knowledge and skills to carry out geological prospecting at the site of the polymetallic nodules and to gain the ability to plan, conduct, direct and monitor such work.

During the latest, 12th session of the PrepCom, taking into account the IOM's obligations, in accordance with paragraph 1 (e) (i) of resolution II, the IOM relinquished its sector B₃, an area of 30 672 sq. km in the southern part of its pioneer area, *i.e.* 20.45% of this area (doc. LOS/PCN/L.115).

The General Committee of the PrepCom recorded the notification of relinquishment of part of the IOM's pioneer area (Kotliński and Tkaczenko, 1994a).

In accordance with paragraph 8 of the understanding on the fulfilment of the IOM's obligations, the IOM during this session submitted a preliminary report containing the data base disks for sample stations (depth, abundance, metal content) and geological information with various types of maps and graphs to the General Committee of the PrepCom (Kotliński and Tkaczenko, 1994b). The General Committee of the PrepCom took note of the report (doc. LOS/PCN/L.115). The IOM also submitted to the General Committee of the PrepCom periodic annual reports on its pioneer activities.

The IOM has worked out a long-term programme covering the period from 1992 to 2000, which aims to provide a reserve supply in the pioneer area and technological preparation for large-scale mining in the future. While exploration in the pioneer area is regarded as the major activity, the feasibility studies and analyses of the design and development of a deep sea-bed mining system as well as processing techniques are also covered by this programme. Moreover, research items on geology and ecology related to exploration, as well as comprehensive items in association with the overall research and development activities are included in our plan. The IOM has been paying particular attention to detailed exploration since the time of its registration as a pioneer investor. The strategy for exploration is a progressive reduction of the sampling grid intervals to such an extent that part of the pioneer area will be relinquished. The IOM is making efforts to reflect the instructive ideas recommended by the PrepCom.

Geological-ecological studies are being carried out along with exploration focused on searching and evaluating the mining area. The research includes studies of the distribution and formation of polymetallic nodule deposits, the composition and geochemistry of polymetallic nodules and sediments, methods of exploration, resources estimation as well as an evaluation of the environmental impact of deep sea-bed mining. The IOM is developing technical criteria for exploration, laboratory analyses and testing, establishing a data base, conducting a market projection for the future supply and demand of metals in order to establish an economic model for the exploitation of polymetallic nodules. In view of the present technological level of the certifying states and the trend of development in deep sea-bed mining technology the world over, the items for designing a mining system are related to research into ore collection and lifting. Study items in processing techniques include the metallurgical method, devoted at present to making comparative studies both in wet and fire metallurgy in the laboratory, and in ore dressing techniques. The IOM will pay more attention to interna-

tional cooperation and exchange with the registered pioneer investors in such fields as mining systems, deep sea-bed environmental protection and the management of the ocean's mineral resources.

Today, three broad areas of somewhat overlapping concerns have affected the progress of deep sea-bed mining along the evolutionary stages leading from concept to reality:

- legal aspects,
- economic factors,
- technological developments.

The political and legal regime with respect to activities in the Area, in accordance with the United Nations Convention which will come into force on 16 November 1994, and the rules, regulations and procedures concerning this Convention and the Implementation of Part XI of the Convention, will be organized and controlled by the International Sea-Bed Authority.

Although the estimation of mineral resources is to some extent dynamic and subjective, forecasts indicate continuously rising costs of mining, extraction and recovery of major alloying elements contained in polymetallic nodules (manganese, nickel, copper, cobalt) from already existing land mines. It seems that after 2000 years, the traditional methods of extraction will not only be more expensive, but also more dangerous to the ecology of the natural environment when compared to deep-sea mining. Thus, oceanic polymetallic nodules are an alternative to land deposits.

Economic factors are at the moment not supportive of the rapid development of the ocean mining industry but, in our opinion, commercial ocean mining will become a practical proposition by the year 2025 or even 2020.

An important consideration in the economics of sea-bed mining, particularly for the first generation of mining systems, is the abundance and grade of the resource itself. These factors, along with market conditions, will influence the number of simultaneous mining operations that can be sustained (Thiel *et al.*, 1992).

Taking into account the possibilities of technological development, the exploitation of deep-sea polymetallic nodules will require four stages: lifting from the ocean bottom (mining), transportation to processing facilities, extraction of the metals, and the manufacture of saleable products (processing) (Lenoble, 1993).

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Important facts and events in the IOM's activities

- 27.04.1987 Interoceanmetal Joint Organization (IOM) established by member States – Bulgaria, Cuba, Czechoslovakia, German Democratic Republic, Poland, Vietnam, USSR – on the basis of an Intergovernmental Agreement.
- 10.05.1987 First meeting of the IOM Council.
- 16.12.1987 The IOM began activities at Szczecin, Poland. Its main task was the exploration and exploitation of polymetallic nodules.
- 28.06.1988 Eastern part of the Clarion-Clipperton Fracture Zone in the Pacific Ocean approved by the IOM Council as the main objective of the IOM's prospecting activities.
- 25.11.1988 Plan for prospecting in the application area, covering a total of 540 000 sq. km, approved by the IOM Council.
- 1988–1989 Prospecting in the application area of the Clarion-Clipperton Fracture Zone carried out by the IOM.
- 23.11.1989 Vietnam left the IOM Agreement.
- 29.11.1990 Application by the Governments of the Republic of Bulgaria, the Republic of Cuba, the Czech and Slovak Republics, the Republic of Poland and the Union of Soviet Socialist Republics as certifying States for registration of the Interoceanmetal Joint Organization as a pioneer investor and for the allocation of a pioneer area in accordance with the United Nations Convention on the Law of the Sea and Resolution II of the Third United Nations Conference on the Law of the Sea approved by the IOM Council.
- 13.03.1991 Application for registration of the IOM as a pioneer investor (doc. LOS/PCN/118) received by the Preparatory Commission of the International Sea-Bed Authority and the International Tribunal for the Law of the Sea (the PrepCom).
- 27.05.1991 Germany left the IOM Agreement.
- 06.08.1991 Application (doc. LOS/PCN/BUR/INF/R.11) published by the IOM.

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- 22.08.1991 In compliance with the motions of the Group of Technical Experts, included in document LOS/PCN/BUR.8 dated 5 July 1991, the General Committee of the PrepCom decided to register the IOM as a pioneer investor, document LOS/PCN/122 dated 22 August 1991.
- Since 1992 Exchange of visits and the commencement of long-term co-operation in the fields of geological and ecological investigations and deep-sea mining systems between the IOM and the COMRA (China).
- 30.07.1992 Certificate of Registration of the Interoceanmetal Joint Organization (IOM) as a pioneer investor issued by the Secretary General of the United Nations H. E. Mr. Boutros Boutros Ghali.
- 20.08.1992 Understanding on the fulfilment of obligations by the registered pioneer investor, the Interoceanmetal Joint Organization (IOM) and its certifying States, namely the Republic of Bulgaria, the Republic of Cuba, the Czech and Slovak Republics, the Republic of Poland and the Russian Federation, document LOS/PCN/L.108. Annex adopted by the General Committee of the PrepCom.
- 09.02.1993 Proposal for the training programme for the PrepCom submitted by IOM and its certifying States (doc. LOS/PCN/TP/1993/CRP.12) published.
- 26.03.1993 IOM's training programme (doc. LOS/PCN/TP/1993/CRP.12/Rev.1) approved by the General Committee of the PrepCom.
- Since 1992 Annual reports of the IOM's activities and its certifying States in the pioneer area submitted to and approved by the PrepCom.
- 20.09.1993 Official opening of the new IOM headquarters in Szczecin, ul. Cyryla i Metodego 9, Poland.
- 09.02.1994 Selection of candidates by the Training Panel for designation by the PrepCom in respect of traineeships under the training programme offered by IOM, namely:
- Mr. Jong-Nam Kim (Republic of Korea),
 - Mr. Arif Hussain (Pakistan),
 - Mr. Ali Ibrahim Ahmed (Sudan),
 - Mr. Alexander Shevchyonok (Belarus),
- (doc. LOS/PCN/BUR/R.36).

- 12.08.1994 IOM relinquished some 20 per cent of the total registered area of 150 000 sq. km, *i.e.* 30 672 sq. km or 20.45% of the pioneer area (sector B₃) document LOS/PCN/L.115.
- 12.08.1994 Preliminary report to the General Committee of the Prep-Com containing the data base (computer disks for sample stations) and complex geological-geophysical information with various types of maps and graphs of the area allocated to the International Sea-Bed Authority submitted by the IOM.
- 20.08.1994 Beginning of long term co-operation with Russia, Japan and the USA in a deep-sea-bed mining impact study involving the monitoring of the biological impact for a period of five years within the Benthic Impact Experiment (BIE).
- 31.10.1994 Commencement of the IOM's Training Programme at Szczecin.

Ryszard Kotliński

Michał Wilczyński