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AD HOC COMMITTEE TO STUDY THE PEACEFUL  
USES OF THE SEA-BED AND THE OCEAN FLOOR  
BEYOND THE LIMITS OF NATIONAL JURISDICTION

ECONOMIC IMPLICATIONS OF THE EXPLOITATION OF MINERAL RESOURCES  
ON AND UNDERLYING THE SEA-BED AND OCEAN FLOOR AND ITS SUBSOIL  
WITH PARTICULAR REFERENCE TO WORLD TRADE AND PRICES

Note by the Secretariat

1. Among the deep sea mineral resources, the exploitation of which might have economic implications with reference to world trade and prices, the deposits of manganese<sup>1/</sup> and phosphorites deserve special attention. To a certain extent, the same may be said of metal concentrations in exotic sources such as the "hot brines" and their associated sediments of the Red Sea. Although petroleum and gas reserves exist in the deeper water regions of the outer continental shelf and continental slope, it does not appear for the time being that their eventual exploitation would influence the world market.

Manganese

2. The characteristics of the manganese deposits are described in the report by the Secretary-General to the Economic and Social Council (E/4449, Add.1, pages 30 to 37). Some of the existing deposits are notably rich in manganese (up to 48.8 per cent); others, less rich in manganese, often have larger associated concentrations of cobalt, nickel, and copper (up to 1 or 2 per cent each). Interest by the mining industry appears to be chiefly centred around associated low-grade ores of copper, cobalt and nickel contained in manganese nodules, rather than on manganese itself.

<sup>1/</sup> Manganese nodules also contain varying quantities of cobalt, nickel, copper, etc., which increase their value.

3. It must be pointed out that some of the highly industrialized countries have to import most of their present consumption of manganese from some developing countries, the economies of which rely heavily on these exports.<sup>2/</sup>

#### Phosphorite

4. The characteristics of submarine phosphate deposits are described in the report of the Secretary-General (E/4449, pages 17 to 30). These occurrences are apparently related either to regions of upwelling or to outcrops of phosphatic rock similar in geological origin to that being mined ashore.

5. The world output of phosphate rock (the crude source of phosphorite) was 62,300,000 short tons in 1962 and it increased to 98,440,000 short tons in 1966.<sup>3/</sup>

6. It may be noted in this context that a number of developing countries produce a not inconsiderable amount of phosphate and export most, if not all, of their production. In addition, a number of developing countries depends on phosphate import for their agriculture.

#### Red Sea "Hot Brines"

7. The deposits contained in solution within sea waters have attracted attention due to the recent discovery of hot high-gravity brine pools in the middle of the Red Sea. Other occurrences similar to those discovered in the Red Sea are likely to exist elsewhere in the oceans, particularly where rifting in the underlying geological formations has opened paths for the migration of ascending ore solutions and descending sea waters.

8. Bottom sediment sampling within the "Atlantis Deep", one of the three located within an area of approximately ten miles square, indicates the possibility of \$US1,500 million gross value of gold, copper, zinc, and silver to a depth of ten metres below the sea floor; these metals have been precipitated from the brine, analyses of which show metals such as iron, manganese, zinc,

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<sup>2/</sup> See annex I, Leading world producers and exporters of manganese ore, and annex II, Origin of manganese ore imported by the United States.

<sup>3/</sup> See annex III, Leading world producers and exporters of phosphate rock.

lead, copper, silver and gold in concentrations from 1,000 to 50,000 times the amounts present in normal sea water.<sup>4/</sup>

Other possibilities

9. In addition, a method of extracting uranium from sea water has apparently been developed which could be competitive with low grade uranium ores, while gold concentrations as high as almost 60 mg. per ton have been analysed in sea water, constituting a relatively high grade gold prospect if contained in a sufficient body of water. All these may have future economic importance.<sup>5/</sup>

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10. For a study of the effects on world trade and prices of the exploitation of mineral resources on or underlying the sea-bed and ocean floor, it is recommended that the following items, inter alia, be taken into consideration:

1. Factors influencing the present world demand and supply:
  - (a) World reserves, production and consumption by countries;
  - (b) Evolution of costs and prices;
2. Factors influencing the costs of marine mineral development (physical and chemical characteristics of the ores - beneficiation problems, transportation, etc.);
3. Possible repercussions of marine mineral development on the exports of countries producing similar types of minerals with special attention to those which are developing countries.

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<sup>4/</sup> Information derived from a summary on "Economic Significance of Minerals Deposited in the Red Sea Deeps" by T.N. Walthier, Manager, International Exploration, Occidental Minerals Corporation, Denver, Colorado (formerly Manager Special Projects, Bear Creek Mining Company) and Clifford E. Schatz, Senior Oceanographer, Bear Creek Mining Company, San Diego, California.

<sup>5/</sup> Report of the Secretary-General, E/4487, p. 29, para. 83.

ANNEX I

Leading world producers and exporters of manganese ore

Country	1966	1965
	Production (short tons)	Exports (metric tons) <sup>1/</sup>
USSR	8,818,000	1,035,000
South Africa	1,866,166	985,151
India	1,847,000	not available
Gabon	1,403,814	1,149,462
Brazil	1,366,093	1,067,763
China (mainland)	1,102,000	not available

Source: U.S. Bureau of Mines, Mineral Yearbook, 1966, "Manganese",  
table 9, p. 324.

<sup>1/</sup> 0.9 metric ton is equal to 1 short ton.

ANNEX II

Imports of manganese ore by the United States

From country	1966 Imports (short tons)
Brazil	682,921
Gabon	497,000
India	320,723
Ghana	287,367
South Africa	260,679
Congo (Kinshasa)	221,128
Other countries	<u>283,886</u>
	<u>2,553,704</u>

Source: U.S. Bureau of Mines, Mineral Yearbook, 1966, "Manganese",  
table 9, p. 324.

ANNEX III

Leading world producers and exporters of phosphate rock

Country	1966	1966
	Production (short tons)	Exports (metric tons)
United States of America	39,050,000	9,248,000
USSR	32,190,000	not available
Morocco	10,405,000	10,068,217
Tunisia	3,527,000	2,679,352
Nauru	2,245,000	2,245,000
Senegal	1,251,000	1,184,715
Togo	1,228,000	1,225,028

Source: U.S. Bureau of Mines, Mineral Yearbook, 1966, "Phosphate Rock", table 14, p. 533.