SEABED COUNCIL HEARS EXPERT PRESENTATIONS ON MARKETS FOR SEABED MINERALS AND CURRENT TRENDS AND CHALLENGES IN MINING TECHNOLOGY

Two expert presentations, on markets for seabed minerals and metals, and current trends and challenges in mining technology, held the interest of the Council of the International Seabed Authority (ISA) as the Authority’s fourteenth session continued in Kingston this morning.

The seminar presentations were made by Professor Phillip Crowson from the Centre for Energy, Petroleum, and Mineral Law and Policy at the University of Dundee, Scotland, and Professor Caitlyn L. Antrim, founder and director of the Center for Leadership in Global Diplomacy, who was a working group leader at a joint ISA-India workshop in February, 2008.

Professor Crowson presented some global trends and developments in supply, demand and prices for cobalt, copper, manganese and nickel, the metals of primary commercial interest likely to be derived from seabed mining. He also gave estimates of the current status of reserves and world resources for each metal.

Professor Crowson concluded that deep seabed minerals would not substitute for land-based mineral but contribute to the world’s rising needs alongside new land-based development.

Professor Antrim summarized the report of the International Seabed Authority’s workshop jointly organized with the Ministry of Earth Sciences of the Government of India in Chennai. She said the financial outlook for deep seabed mining has changed for the better due to the effects of metal prices increasing significantly faster than equipment and operating costs.

Listing the trends in the metals of interest to members of the Council, Professor Crowson said the production and use of manganese had grown by a compound annual average of 7.3% since 2001, even faster than the growth of crude steel output. Production was expected to increase from 12 million tonnes in 2007 to 18 million tonnes in 2015. Demand for nickel grew
by an average 3.3% per annum from 2001, slower than the 3.6% per annum experienced in 1992. However, forecasters were predicting a strong recovery in 2008-9 partly based on a revival in demand for stainless steel production, nickel-bearing products in the aircraft industry, and for nickel-based batteries. Output of primary nickel, he said, was expected to rise by 30% in 2010.

“Cobalt has developed a new lease on life over the past decade with demand and production rising by nearly 11% per annum,” Professor Crowson noted. He said total usage of the metal for aircraft and rechargeable batteries production would continue to rise, and large increases in mine capacity were projected up to 2011.

As with nickel, Professor Crowson said the growth in the demand for copper has been led by China and other Asian countries, with China accounting for 27% of global usage in 2007. Output of refined copper fell below usage in 2003-05, and again in 2007, but, he said, it kept pace with rising demand over the longer run. Mine capacity, which grew by some 15% between 2003 and 2007, is expected to rise sharply into 2011.

Other highlights of the presentation were:

- Manganese ore prices averaged well below $3/mtu since 1980; but shot up in 2007 and are now $13-14/mtu.
- Nickel prices have risen in response to tight markets. Prices are expected to return to long-run equilibrium level of $11-13,000/tonne.
- Cobalt prices breached the $50 mark earlier in 2008 and are still close to that level.
- Copper prices moved decisively above their long-run average in 2005, with the rise partly funded and sustained by fund investment. Present prices are, however, unsustainably high, and will likely subside when the market moves back into surplus.

**Second presentation**

Before beginning her presentation on the Chennai workshop, Professor Antrim provided some background on the investigations into the potential viability of seabed mining. In January 1994, the Preparatory Commission for the International Seabed Authority had convened a meeting of a group of technical experts to review the state of deep seabed mining and make a projection of when commercial production might begin.

The Group concluded that the capital and operating costs of deep seabed mining were too high when compared to projected revenue and, as such, commercial activities would not take place before 2000 and were unlikely before 2010.

However, Professor Antrim explained that in the 14 years since the Group’s report, a number of economic and technical factors had affected the outlook for mining the primary metals of interest (nickel, copper, cobalt and manganese) in the deep seabed, including: changes in nickel supplies; changes in manganese demand; new nickel and cobalt markets; changes in prices; Russian nickel supply and demand; and the introduction of ocean technologies.
The efforts of the Chennai workshop centred on the development of a preliminary cost model for a deep seabed polymetallic nodule mining and processing venture, based on a twenty year, 1.5 million ton per year operation. Inputs to the model came from sixteen technical and legal presentations made by participants, collaborating in three working groups.

The first working group provided capital and operation expenses for polymetallic nodule mining ventures, based on the recovery of 1.5 million and 1.2 million wet tons of nodules per year from a site located 6,000 nautical miles from a land-based processing facility, and using different collector systems and a flexible riser system.

The second working group provided estimated expenses for a polymetallic nodule processing plant with an annual capacity of 1.5 million tons, producing nickel, copper, cobalt and manganese, and compared expenses with nickel laterite processing plants.

Working Group 3 reviewed models of first generation polymetallic nodule mining systems presented by the Texas A & M University (TAMU), the United States Bureau of Mines, the Australian Bureau of Mines, and Massachusetts Institute of Technology (MIT 1984). The group selected the MIT 1984 model as the basis on which to assess systems proposed by the two other working groups. Other elements, including trends in metal prices, capacity range of operations and length of mine-life were incorporated into the model.

The main conclusions of the workshop indicated that the financial outlook for deep ocean mining had improved considerably since the projections made fourteen years ago by the expert group. Furthermore, based on past analyses and current research and projected metal prices trends, deep seabed mining for high nickel-copper-cobalt mine sites in the Clarion-Clipperton region met the economic and investment criteria to be considered for investment and development.

Based on estimates of the working groups, several combinations of mining transport and processing systems demonstrated internal rates of return (IRR) close to the 15% level which was used to assess the viability of land-based deposits. However, additional work was required to evaluate improvements in design that might lower cost in mining and processing, she said.

**Discussions**

Discussions following the presentations focused on recycling tailings from processed ore, extracting by-products from primary mineral, onboard processing and toxic waste management, as well as concentration of global mining production.

Indonesia began the discussions with a question about how the tailings (the waste materials) would be disposed of once the valuable minerals had been extracted from the ocean rocks. New Zealand asked about different options for onboard processing of raw materials, the possibilities for returning processed tailings to the marine environment, and any toxic effects that might have on the environment.

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On a question from the Secretariat on whether metals mining and production would remain concentrated among five mining entities, Professor Crowson said the five controlled some 55% of total output while another twenty or so other entities controlled the remainder. Since 2003, he said mining companies had been restricting production and focusing on producing value for shareholders.

Senegal wanted to know how long the current favourable cycle would last. He also had a question about potential competition between land-based and deep seabed mining. Professor Crowson said the present cycle of high prices for minerals was longer than most post-war upswings, but he expected supplies to rise steadily and prices to level off by 2010. Competition would be based purely on economics – the cost of producing on land versus deep seabed production, he added.

Professor Antrim responded that one solution might be to locate the processing plant close to flat, unused land and to store the tailings in ponds, leave them to dry out and then cover them up. With regard to returning processed rock to the ocean, she said that would have to be done via pipes leading directly to the seabed to avoid damage to the environment on the way down.

Addressing the issue of onboard processing, the observer from the United States confirmed that preliminary processing was possible for crusts by way of a flotation technique which separated mineralized from barren rock and pumped the tailings back to the sea floor. He further explained that if waste material were pumped below the photic zone (where photosynthesis could occur, it was unlikely to lead to toxic effects because of the absence of bioavailability in the deep ocean.

The Council will meet at 3 p.m. today to take up the report of the Finance Committee and to resume consideration of the draft regulations on polymetallic sulphides.

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