THE MINERAL INDUSTRY OF MALAYSIA

By John C. Wu

Malaysia, which borders Brunei, Indonesia, and Thailand in Southeast Asia, was a middle-income developing country in Asia and the Pacific. It has a total land area of about 328,600 square kilometers (km²) and, in 2003, had a population of about 25.1 million. In 2003, Malaysia’s per capita gross domestic product (GDP) based on purchasing power parity was estimated to be $9,471 (International Monetary Fund, 2004§). Malaysia’s identified mineral resources were barite, bauxite, carbonate rocks, clays, coal, copper, gold, natural gas, iron ore, crude petroleum, silica, tin, and minerals associated with tin placer deposits, such as ilmenite, monazite, struverite [a columbium (niobium)/tantalum-bearing mineral], and zircon. In 2003, Malaysia’s proven reserves of natural gas ranked 14th in the world (Oil & Gas Journal, 2003b). Malaysia was the world’s third ranked exporter of liquefied natural gas (LNG) after Indonesia and Algeria in 2003 (Poten.com, 2003§).

Malaysia’s economy continued to improve in 2003 owing mainly to growth in the manufacturing and mining sectors. Malaysia’s GDP in 1987 constant dollars grew by 5.2% in 2003 compared with 4.1% in 2002. The output of the manufacturing sector grew by 8.2% in 2003 compared with 4.0% in 2002, and the output of the mining and quarrying sector grew by 4.8% in 2003 compared with 3.7% in 2002. The higher growth rate in the mining and quarrying sector was a direct result of increased production of oil and natural gas. In 2003, the mining and quarrying sector contributed 7.2% to Malaysia’s GDP; more than 95% of this contribution was by the oil and gas industry. In 2003, Malaysia’s GDP in 1987 constant dollars was estimated to be $60.71 billion, of which $4.36 billion was contributed by the mining and quarrying sector (Central Bank of Malaysia, 2004c§; International Monetary Fund, 2004§).

Government Policies and Programs

Because of the economic slowdown during 2002 and early 2003, the Government announced a $1.9 billion economic stimulus package in May 2003 to revive the Malaysian economy. The economic slowdown reportedly was worsened by the outbreak of Severe Acute Respiratory Syndrome (SARS), the Iraq war, and a 40.7% drop in foreign direct investment. The Government intended for the economic stimulus package to encourage private investment, to strengthen the country’s competitiveness, and to develop new sources of growth. The package also was expected to help Malaysia reduce its dependence on exports and cope with the difficult economic environment and to enable the country to carve a niche for itself in Southeast Asia.

To attract investments, restrictions on foreign-equity participation in new projects were lifted, and foreign investors were allowed to hold a 100% equity interest in new projects without any export commitments. For new sources of growth, the Government would emphasize and promote tourism, education, and health in the service sector and, in the manufacturing sector, the Government would promote production of value-added goods (Asian Chemical News, 2003).

Environmental Issues

To restore disused mining land, the Forest Research Institute of Malaysia (FRIM) reportedly launched a pilot program in 2001 to rehabilitate the 121.4-hectare (ha) former tin mine site in Bidor, State of Perak, which had been given to the FRIM by the State Government, and to turn the land into tropical forest plantations. According to the FRIM, the project, which was in its third year in 2003, was expected to show full results in 20 to 30 years. The former tin mining land was made up of unproductive sand tailings and slime. The project was to change the condition of the soil by adding fertilizer and nutrients. Under this pilot program, 13 species of forest trees with high commercial value have been planted. The trees that were growing well included mahogany, teak, and such local species as acasia, malabera, meranti bukit, merawan siput jantan, merbau, bersawa, setang, and such local medicinal plants as mengkudu and tongkat Ali. The rehabilitation project was funded by the Government and by the Association of Southeast Asian Nations (ASEAN)-Korea Environmental Cooperation. If the pilot program is proven a success, then it could become an economic model for other former mining land of about 113,700 ha, of which 97,260 ha was unproductive sand tailings and slime. According to past studies, many of those former mining lands contained potentially toxic heavy metals, which were not suitable for growing fruit trees and vegetables. Most former mining land is located in the States of Johor, Kuala Lumpur, Perak, and Selangor (New Straits Times, 2003a, c).

Production

In 2003, Malaysia produced bauxite, coal, carbonate rocks (construction aggregate and limestone), feldspar, gold, ilmenite, iron ore, kaolin, mica, monazite, natural gas, crude petroleum, sand and gravel, silica, struverite, tin, and zircon concentrate. Despite the higher tin prices in the Kuala Lumpur Tin Market, production of tin dropped to an historically low level in 2003 because of depleting ore reserves and lower ore grades. Production of natural gas and crude petroleum increased in 2003 because of increased exports of crude petroleum and LNG. Production of processed mineral products included cement, refined gold, refined lead (secondary), LNG, nitrogen fertilizer materials (ammonia and urea), refined petroleum products, crude steel, titanium dioxide pigment, and refined tin (table 1).
Trade

In 2003, Malaysia’s exports increased by 11.5% to $104.97 billion compared with $94.13 billion in 2002; imports increased by 4.9% to $83.62 billion compared with $79.75 billion in 2002. Malaysia’s merchandise trade surplus increased by 180% to $10.84 billion compared with $3.87 billion in 2002 owing to a 36% increase in export earnings from palm oil, a 35% increase in export earnings from LNG, and a 35% increase in export earnings from crude petroleum in 2003. Malaysia remained a net exporter of minerals in 2003 because of its large exports of LNG and crude petroleum. In 2003, the major export mineral commodities were crude petroleum ($4.12 billion), LNG ($3.51 billion), and refined tin ($74.7 million) (Central Bank of Malaysia, 2004a§, b§).

Malaysia had a trade deficit in nonfuel minerals and processed mineral products that excluded oil and gas during the past several years. In 2002 (the last year for which data were available), exports of major minerals totaled $38.2 million. Of this total, $24 million was for nonmetallic minerals; $14 million, metallic minerals; and $200,000, others. Imports of major minerals totaled $384 million in 2002. Of this total, $174 million was for coal; $139 million, metallic minerals; and $71 million, nonmetallic minerals. Exports of major processed mineral-based products totaled $2.31 billion in 2002. Of this total, $1.69 billion was for processed metallic mineral products; and $618 million, processed nonmetallic mineral products. Imports of major processed mineral-based products totaled $5.07 billion. Of this total, $4.57 billion was for processed metallic mineral products, and $496 million, processed nonmetallic mineral products (Minerals and Geoscience Department [Malaysia], 2003a, p. 7-9).

Malaysia’s imports of minerals and their products continued to outweigh exports in 2003. According to the Ministry of Primary Industry, this situation might prompt the Government to shift its policy and push for greater expansion of the domestic minerals industry. Doing so would make it possible for the country to reduce imports of essential minerals and mineral-based products because most of these imported minerals, such as coal, many nonmetallic minerals, and tin ore, were available in Malaysia (Star, The, 2003a).

Structure of the Mineral Industry

Malaysia’s mining industry consisted of a small mining sector of coal and ferrous and nonferrous metals, a small mineral-processing sector of ferrous and nonferrous metals, and a large mining and processing sector of industrial minerals and oil and gas. With the exception of oil and gas, mining and mineral-processing businesses were owned and operated by private companies incorporated in Malaysia. Oil and gas exploration, production, and processing businesses were owned and operated by Petrolian Nasional Berhad (PETRONAS), which was the state-owned oil and gas company, and by joint ventures of PETRONAS and foreign companies. Total employment of the mining and quarringy sector was about 29,000, or about 0.3% of the country’s total work force in 2002 (the last year for which data were available) (International Monetary Fund, 2004, p. 6).

The structure of the mineral industry changed in 2003. Production capacity of barite, bauxite, and tin continued to decrease because of depleting ore reserves. Malaysia’s sole tin smelter had extended its business into mining by acquiring Radman Hydraulic Tin Bhd. which was one of Malaysia’s leading tin miners. The country’s cement industry went through further consolidation in 2003 and Hongkew Holdings (M) Sdn. Bhd. resumed construction of an abandoned half-finished cement plant, which was scheduled for completion in the next 2 to 3 years. Malaysia brought onstream seven new offshore oilfields and gasfields and the Malaysia LNG Tiga Sdn. Bhd.’s LNG plant during 2003. As a result, Malaysia’s oil and gas production capacity increased by about 4%, and its LNG production capacity, by about 43% in 2003.

Commodity Review

Metals

Aluminum.—In 2003, Charus Development Corp. and its partners, which proposed to build a 500,000-metric-ton-per-year (t/yr) aluminum smelter in the State of Perak, decided to construct its own powerplant instead of purchasing power from the state-owned power company after the Malaysian Prime Minister gave a verbal endorsement. By May 2003, the joint-venture firm, MASCO Aluminium Sdn. Bhd., was established to develop the aluminum smelter. Under a new plan, the $3.42 billion aluminum smelter complex would comprise a primary aluminum smelter that would be constructed at the Lumut Port Industrial Zone in Perak in two stages, and a powerplant. In the first stage of smelter construction, which would be completed by late 2005, the smelter would have a capacity of 230,000 t/yr; in the second stage, which would be completed by late 2008, an additional 460,000 t/yr capacity would be added for a total capacity of 690,000 t/yr (instead of 500,000 t/yr). The dedicated powerplant, which would consist of seven 300-megawatt (MW) coal-fired generating units, would supply power to the aluminum smelter complex. The coal-fired powerplant would be built within 3 kilometers (km) of the aluminum smelter. According to the Perak State Development Corp., construction of the powerplant was expected to begin by late 2003, and construction of the aluminum smelter would begin soon after. The primary aluminum smelter turnkey contractor was awarded to China Metallurgical Equipment Corp., which would use 300 kilovolt-ampere pre-bake cell technology from the Shengyang Aluminium and Magnesium Engineering and Research Institute of China; the smelter project management consultant was Kaiser Engineers of the United Kingdom (Sun, The, 2003a, b).

According to the Dubai-based Gulf International Investment Group Capital (GIIG Capital), its $2 billion aluminum smelter project in Sarawak, East Malaysia, was proceeding according to schedule despite a report that Dubai Aluminium Co. Ltd. (Dubal), which was the project’s other partner, had withdrawn from the proposed project for unknown reasons. In March 2003, a memorandum of understanding (MOU) was signed between the state-owned Sarawak Hidro Sdn. Bhd. (SHSB) and Smelter Asia Sdn. Bhd. (SASB), which was a joint-venture company established by Dubal and GIIG Capital to develop the proposed...
aluminum smelter near Bintulu in Sarawak. Under the MOU, the Bakun Hydroelectric Dam, which would be developed by SHSB, would sell up to 900 MW of electricity, which was more than one-third of its 2,400-MW power-generating capacity, to the SASB’s aluminum smelter by 2012. According to SASB, construction of the aluminum smelter was expected to begin by the end of 2003 and the first-phase production of 250,000 metric tons (t) primary aluminum ingots was scheduled to start in 2005. In 2003, SASB was conducting an environmental impact assessment study. The company reportedly planned to install the latest computerized control and fume treatment system into the plant and would also employ the best health, safety, and environmental practices (Star Online, The, 2003§).

Gold.—In 2003, gold was produced mainly from the Penjom Mine in the State of Pahang and a few other small-scale gold mines in the States of Pahang, Kelantan, and Terengganu. A small quantity of gold also was produced as byproduct from tin mines in the State of Selangor.

Avocet Mining PLC, which was Malaysia’s largest gold mining company, operated the Penjom Mine at Ampang Jaleh near Kuala Lipis through Specific Resources Malaysia Sdn. Bhd. (a wholly owned subsidiary of Avocet Mining). According to Avocet Mining, the Penjom Mines produced 3,869 kilograms (kg) of gold in the fiscal year that ended on March 31, 2004; 3,387 kg of gold in the fiscal year that ended on March 31, 2003; and 3,339 kg of gold in the fiscal year that ended on March 31, 2002. Increased gold production in the fiscal year that ended on March 31, 2003, was due to higher ore grade and increased recovery rate. In the fiscal year that ended on March 31, 2003, the Penjom Mine mined 14.4 million metric tons (Mt) of ore and waste and processed 523,600 metric tons (t) of ore compared with 20.6 Mt and 539,000 t, respectively, in the fiscal year that ended on March 31, 2002. The average ore head grade was 7.28 grams per metric ton (g/t) gold, and the process recovery rate was 89% compared with 7.14 g/t gold and 87%, respectively, in the fiscal year that ended on March 31, 2002. Plant throughput, however, was slightly reduced owing to milling of harder rock in the fiscal year that ended on March 31, 2003 (Avocet Mining PLC, 2003§, 2004§).

In early 2003, Avocet Mining conducted a re-evaluation of Penjom’s mineral resources potential to obtain a better understanding of Penjom’s complex geology. Penjom mineral resources were revised according to the improved understanding of mineralization controls developed by the company’s exploration team. As a result, the Penjom gold resources estimates were revised to 4,767,500 t with an average grade of 4.46 g/t gold at a 0.8 g/t gold cut-off. Of these gold resources, 811,300 t was measured resources at a grade of 5.63 g/t gold; 1.58 Mt, indicated resources at a grade of 4.95 g/t gold; 1.62 Mt, inferred resources at a grade of 4.16 g/t gold; and 754,300 t, stockpiled resources at a grade of 2.83 g/t gold. For gold exploration in Malaysia, Avocet Mining acquired the right to explore in a 5,600-ha area known as Sungai Luit (River of Money) in the State of Pahang; the company allocated a total of $2.5 million for this project in 2003. The 2003 budget included development of an underground mine at Penjom (Avocet Mining PLC, 2003§).

Iron and Steel.—The amount of low-grade iron ore produced from several small iron mines in the States of Pahang, Perak, and Terengganu was small compared with Malaysia’s iron ore requirements for its iron and steel industry. Malaysia exported between 25% and 50% of its low-grade iron ore production to China and Hong Kong and the remainder was consumed by domestic pipe-coating plants and cement plants. All high-grade iron ore requirements for Malaysia’s two iron-reduction plants were imported mainly from Brazil, Bahrain, Canada, and Chile. Most other raw-material requirements for Malaysia’s iron and steel industry, such as ferroalloys, pig iron, steel and alloy ingots, semifinished steel products, and waste and scrap, were also met by imports (Minerals and Geoscience Department [Malaysia], 2003a, p. 29).

Malaysia’s production of direct-reduced iron (DRI) was by the state-owned Perwaja Steel Sdn. Bhd., which operated a 1.2-Mt/yr DRI plant in Kemaman in the State of Terengganu. Production of hot-briquetted iron was by Amsteel Mills Sdn. Bhd., which operated a 700,000-t/yr hot-briquetted iron plant on Labuan Island off Sabah. Malaysia’s production of DRI and hot-briquetted iron totaled 1.6 Mt in 2003 compared with 1.08 Mt in 2002 (Midrex Technologies, Inc., 2003§).

Malaysia crude steel production totaled 4.7 Mt in 2002 (the last year for which data were available) compared with 4.1 Mt in 2001. The major crude steel producers were Amsteel Mills, Antara Steel Mill Sdn Bhd., Malayawata Steel Bhd., Malaysia Steel Works (KL) Sdn. Bhd., and Perwaja Steel. These producers imported 3.1 Mt of steel waste and scrap as one of their main feed materials in 2002. In 2002, imports of other raw materials by the iron and steel industry included 1.5 Mt of ferroalloys, 1.3 Mt of iron ore and concentrate, 544,400 t of semifinished products, 520,702 t of iron and steel ingots, 316,100 t of other alloy steel ingots, 225,201 t of pig iron, 196,286 t of DRI and sponge, and 119,779 t of other intermediate ferrous products (Minerals and Geoscience Department [Malaysia], 2003a, p. 28).

In 2002 (the last year for which data were available), Malaysia’s imports and exports of iron and steel products were 5.4 Mt and 2.0 Mt, respectively. Apparent steel consumption of all steel products was 7.3 Mt in 2002 compared with 7.39 Mt in 2001. The slight slowdown in overall demand for steel in Malaysia in 2002 was a result of weaker domestic demand and reduced exports (Southeast Asia Iron and Steel Institute, 2003§).

Tin.—Malaysia’s tin mine production dropped to a record low because of depleting reserves and lower ore grades despite a higher tin price in 2003. In the Kuala Lumpur Tin Market, the average tin price rose to about $4,950 per ton in 2003 from about $4,030 per metric ton in 2002. During 2003, the total number of operating tin mines averaged 26, and the total number of retreatment plants, 29. Tin produced by the opencast method accounted for 42%; gravel pump, 34%; panning, 15%; retreatment plant, 7%; and dredging, 2%. Malaysia’s only underground tin mine was closed in June 2002 (Minerals and Geoscience Department [Malaysia], 2003b).

Following acquisition of a 75% interest in PT Koba Tin from Ilyuka Resources Ltd. of Australia in April 2002, Malaysia Smelting Corp. Bhd. (MSC) reportedly increased its stake in Marlborough Resources NL of Australia to 30% from 13% in
the industry’s installed capacity. According to an estimate by

the Cement and Concrete Association of Malaysia, domestic
demand for cement grew by about 9% to 13 Mt, and exports of
cement and clinker grew by about 39% to 3.9 Mt in 2003. As of
2003, Malaysia’s installed capacity of cement and clinker was
28.3 Mt/yr and 17.8 Mt/yr, respectively (International Cement
Review, 2003a; Cement and Concrete Association of Malaysia,
2003$).

On June 27, 2003, Malayan Cement Bhd. (MC), which owned
100% equity interest in Associated Pan Malaysia Cement
Sdn. Bhd. and 77.1% interest in Kedah Cement Holding Bhd.,
changed its name to Lafarge Malayan Cement Bhd. (LMC).
LMC, which had a local market share of about 45% and had
plants strategically located in Rawang, Kanthan, Langkawi, and
Pasir Gudang in peninsular Malaysia, was Malaysia’s leading
cement producer with a total cement and clinker production
capacity of 12.8 Mt/yr and 7.9 Mt/yr, respectively. LMC also
owned and operated a cement-grinding plant and a bulk-import
LMC was a subsidiary of Lafarge SA of France, which owned a
60.88% interest in LMC through the acquisition of Blue Circle

Despite the cement industry’s excess capacity in Malaysia,
construction of an integrated cement plant with a clinker and
cement capacity of 1.2 Mt/yr and 1.3 Mt/yr, respectively, was
to be completed by Hongkew Holdings (M) Sdn. Bhd. in Gus
Musang, State of Kalantan, within the next 2 to 3 years in
anticipation of future growth in demand for cement in the local
and overseas markets. In February 2003, YTL Cement Bhd.,
through its wholly-owned subsidiary YTL Cement Marketing
Sdn Bhd., signed an off-take agreement with Hongkew Holdings
as the sole distributor of cement produced by Hongkew
Holdings’ future cement plant in Gua Musang, State of
Kalantan. Hongkew Holdings reportedly obtained its license
in the mid-1990s and started its plant construction before the
1997 Asian financial crisis. By 2003, the Gua Musang plant was
about 50% completed. Hongkew Holdings, which had spent
about $26 million on civil work and some machinery imports,
was to raise $105 million capital by issuing bonds following the
signing of the agreement with YTL Cement to complete the
plant construction that had been abandoned since August
1998 (International Cement Review, 2003b; YTL Cement Bhd.,
2003$).

In September 2003, YTL Cement acquired the remaining
50% interest in Pahang Cement Sdn. Bhd from the Pahang State
Government through Perbadanan Setiausaha Kerajaan Pahang
and Pasdec Corporation Sdn Bhd. Pahang Cement, which had
an integrated plant with a capacity of 1.3 Mt/yr cement and
1.2 Mt/yr clinker, became a wholly owned subsidiary of YTL
Cement (YTL Cement Bhd., 2003$).

Nitrogen (Fertilizer Materials).—Malaysia produced
ammonia and urea using natural gas as feedstock. ASEAN
Bintulu Fertilizer Sdn. Bhd. (ABF) and PETRONAS Fertilizer
(Kedah) Sdn. Bhd. (PFK) produced ammonia and granular
urea, and PETRONAS Ammonia Sdn. Bhd. (PA) produced only
ammonia. Ammonia production capacity (in nitrogen content)
of ABF in Bintulu, State of Sarawak, was 395,000 t/yr; PFK in
Gurun, State of Kedah, 378,000 t/yr; and PA in Kerth, State of
Terengganu, 370,000 t/yr. Granular urea production capacity

Industrial Minerals

Cement.—Cement production increased by 20.3% in 2003
because of increased exports and continued growth in domestic
demand; cement production was equivalent to about 60% of
the industry’s installed capacity. According to an estimate by

April 2003. Marlborough Resources, which was one of the two
major Australian tin mining companies and one of the major
overseas feed suppliers to MSC, operated tin mining and milling
facilities with a capacity of 1,300 t/yr of tin in concentrate at
the Ardelthan Mine, New South Wales, Australia. MSC
reported was looking to acquire more low-cost tin producers
in Australia and other countries, such as Bolivia, Canada, and
China, to improve profit margins ahead of an anticipated growth
in the world demand for tin. In Malaysia, MSC was expected to
acquire a 25% stake in ZR Network Sdn. Bhd., which owned
Malaysia’s largest tin mine at the Klian Intan site in the State of
Perah. ZR Network, which was a Malaysian trading company,
acquired the mining right, lease, and operating assets related
to the tin mine operations at the 699.5-ha Klian Intan site from
Rahman Hydraulic Tin Bhd. for about $3 million in March 2003

MSC, which operated a 30,000-t/yr tin smelter in Butterworth,
imported about 85% of its feed, which was made up of medium-
grade tin concentrate and complex tin-bearing materials. The
medium-grade feed normally contained 40% to 50% tin. The
annual feed for the smelter averaged 40,000 t. MSC products
included Electolytic Grade (4 Nines) Tin, which contained a
minimum of 99.99% tin and had a combined impurity that
did not exceed 0.01%; MSC 3 Nines Low-Lead Tin, which
contained a minimum of 99.9% tin and a maximum of 0.01%
lead; and MSC Straits Refined Tin, which contained 99.85% tin.
MSC shut down two of its four furnaces and operated at about
one-half of its capacity between November 2002 and August
2003 because of weak demand and the tight feed supply. The
smelter resumed normal operation at nearly 80% of capacity in
the last quarter of 2003 when demand for tin in the world market
gradually increased. As a result, refined tin production was
estimated to be 18,000 t in 2003 and was expected to increase
to 30,000 t in 2004 (Metal Bulletin, 2002; Malaysia Smelting

Demand for refined tin for the first 10 months of 2003
increased by 3% to 3,302 t from the same period in 2002. In
2003, the solder industry remained the major end user and
accounted for 54% of the total demand followed by the tin-
plating industry, 16%; the pewter industry, 13%; and other end
users, 17%. Refined tin consumption by the solder industry and
other end users included consumption of domestically refined
and high-grade (99.9% tin) imported refined tin. Exports of
refined tin dropped sharply by 44% to 15,164 t because of the
tight feed supply and reduced production of refined tin by MSC
during the first three quarters of 2003. Export earnings from
refined tin were valued at $75 million compared with $111.9
million in 2002. In 2003, the major buyers of Malaysian refined
tin were the Republic of Korea (32.7%), Australia (12.5%),
Japan (12.3%), Singapore (11.8%), and South Africa (8.2%)

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Mineral Fuels

Natural Gas and Petroleum.—In 2003, Malaysia was a net exporter of natural gas and crude petroleum. Production of natural gas increased to an average of 142 billion cubic meters per day from 132 billion cubic meters per day in 2002. Production of crude petroleum, which included condensate, increased to an average of 735,000 barrels per day (bbl/d) from 698,000 bbl/d in 2002. Malaysia exported about 52% of its crude petroleum and condensate production and about 50% of its natural gas production in the form of LNG in 2003 (Central Bank of Malaysia, 2004b§).

In 2003, Malaysia brought seven oilfields and gasfields onstream. The total number of producing fields increased to 63 from 56. Of those, 48 were oilfields, and 15 were gasfields (PETRONAS, 2003a§). In February, Exxon Mobil Corp. brought the Bintang Gasfield onstream through its wholly owned subsidiary ExxonMobil Exploration and Production Malaysia Inc. (EMEPMI); the field is located about 220 km offshore State of Terengganu. The Bintang contained about 28.3 billion cubic meters of natural gas and had a peak production rate of about 10 million cubic meters per day. The Bintang was developed by the 50-50 joint venture of PETRONAS through its wholly owned subsidiary PETRONAS Carigali Sdn Bhd. (PCSB) and ExxonMobil through EMEPMI, which was the operator (Exxon Mobil Corp., 2003§).

In May, Murphy Sarawak Oil Co. Ltd. (MSOC) (a wholly owned subsidiary of Murphy Oil Corp. of the United States) brought its West Patricia Oilfield onstream. The West Patricia, which is located in block SK 309 about 40 km offshore Bintulu, State of Sarawak, was developed by the joint venture of Murphy Oil, which was the operator (85%), and PCSB (15%) and had a production capacity of 15,000 bbl/d of oil (New Straits Times, 2003b).

As a result of the exploration success in the deepwater areas in the past 2 years, Malaysia’s natural gas and crude petroleum proven and probable reserves increased to 2.52 trillion cubic meters and 4.54 billion barrels, respectively, compared with 2.48 trillion cubic meters and 4.24 billion barrels, respectively, in 2002 (PETRONAS, 2003a§). The country’s proven reserves of natural gas were estimated to be 2.12 trillion cubic meters and accounted for 1.2% of the world total, and its proven reserves of crude petroleum were estimated to be 3 billion barrels and accounted for 0.2% of the world total in 2003 (Oil & Gas Journal, 2003b).

In January, PETRONAS awarded two production-sharing contracts (PSCs) to Murphy Oil and PCSB for oil and gas exploration for deepwater blocks L and M in its exclusive economic zone (EEZ) offshore Sabah, Malaysia. Under the terms of the PSC, Murphy Sabah Oil Co. Ltd. (a wholly owned subsidiary of Murphy Oil) would have a 60% working interest in block L and a 70% in block M. PCSB would own the remaining 40% and 30% working interests in blocks L and M, respectively. Under the terms of the PSCs, the contractors would acquire and process 500 km² of 3-D (three-dimensional) seismic data and drill two exploration wells in each block to a minimum depth of 7,000 meters. Each contractor was expected to spend a minimum of $21 million for exploring blocks L and M (PETRONAS, 2003e§). Murphy Oil has been awarded a total of eight blocks in Malaysia’s offshore area since 1999.

In 2002, Brunei awarded two contracts to Total S.A. and Royal Dutch/Shell for oil and gas exploration for deepwater blocks J and K in its EEZ offshore Brunei. Total S.A. and Royal Dutch/Shell (Brunei’s contractors) and Murphy Oil and PCSB (Malaysia’s contractors) were awarded the right to prospect in the overlapped EEZ area. During the negotiation talks to resolve the dispute, Malaysia proposed that the EEZ area be treated as a joint-development area and offered a 50-50 profit-sharing arrangement (Far Eastern Economic Review, 2003). The dispute still had not been resolved by yearend.

In September, PETRONAS signed a new PSC with PCSB and Sarawak Shell Bhd. for Baram Delta offshore Sarawak following the expiration of the old PSC, which had been awarded in 1988. Under the new contract, Sarawak Shell would use the latest technologies and its worldwide experience to raise the oilfield recovery factor and to extend the life of the aging oil and gas facilities in the Baram Delta that covers the Delta’s Bakau, Baram, Baronia, Betty, Bokor, Failey Baram, West Lutong, Tukau, and Siwa oilfields and three small undeveloped nearby discoveries (Baronis Timur Laut, Fatimah, and Tanjung Baram). The new contract was owned 60% by PCSB and 40% by Sarawak Shell, which was the operator (PETRONAS, 2003f§).

Total LNG production by Malaysia LNG Sdn. Bhd. (MLNG), Malaysia LNG Dua Sdn. Bhd. (MLNG-2), and Malaysia’s third and newest LNG plant, Malaysia LNG Tiga Sdn. Bhd. (MLNG-3), increased to 17.4 Mt compared with 15 Mt in 2002. The construction of the MLNG-3 plant and related facilities next to the two existing plants in Bintulu, State of Sarawak, was completed by Halliburton Co.’s subsidiary Kellogg Brown & Root of the United States and JCG Corp. of Japan in 2003. The first 3.4-Mt/yr natural gas liquefaction train began operations in May 2003, and the second 3.4-Mt/yr train, in October 2003. The related facilities of MLNG-3’s LNG plant included a 120,000-cubic-meter-capacity LNG storage tank and an LNG loading jetty. The plant was owned and operated by MLNG-3. MLNG-3 was a joint venture of PETRONAS (60%), Shell Gas Holdings (Malaysia) Ltd. (15%), the Government of the State of Sarawak and Nippon Oil LNG (Netherlands) BV (10% each), and Diamond Gas Netherlands BV (5%). Malaysia’s three LNG complexes in Bintulu ranked as the world’s single largest LNG production facility with a combined capacity of about 23 Mt/yr (Oil & Gas Journal, 2003a).

In March, MLNG and MLNG-3 signed two separate sale and purchase agreements (SPAs), which were valued at more...
than $20 billion, to supply LNG to the Tokyo Electric Power Co. Inc. and Tokyo Gas Co. Ltd. According to one of the two SPAs, MLNG should supply Tokyo Electric Power and Tokyo Gas with up to 7.4 Mt/yr of LNG for 15 years beginning in April 2003 and with an option to extend for an additional 5 years. The 15-year contract was worth about $20 billion at the prevailing prices in 2003. The other SPA was signed between MLNG Tiga and Tokyo Electric Power for the supply of up to 540,000 t/yr of LNG for 1 year beginning in April 2003 and with an option to extend the time if mutually agreed upon by the two parties (PETRONAS, 2003c§).

In May, MLNG Tiga signed an SPA with Korea Gas Corp. to supply up to 2 Mt/yr of LNG for 7 years beginning in May 2003. The contract was valued at about $3.2 billion at the prevailing prices in 2003 (PETRONAS, 2003d§).

Outlook

The oil and gas industry is expected to continue to dominate the Malaysian mining and quarrying sector, and the Government is expected to continue the policy of developing its hydrocarbon resources with a special emphasis on the development of its natural gas resources for industrial, petrochemical, and power-generation projects approved by the Government during the next 4 to 5 years. Production of natural gas is expected to grow faster than that of crude petroleum. Malaysia could continue to enjoy a mineral trade surplus during the next 4 to 5 years because of its large export earnings from natural gas and crude petroleum.

The country’s metallic and nonmetallic minerals mining industries are expected to continue to shrink during the next 2 to 3 years. The coal mining industry, however, may expand its capacity during the next 4 to 5 years if the Government trade policy shifts to encourage development of domestic resources rather than imports. Under the Government’s 2003 economic stimulus package, the country’s production capacity of value-added mineral products is expected to increase. If the two pending primary aluminum smelter proposals are implemented during the next 2 to 3 years, then Malaysia could become an important primary aluminum producer in Southeast Asia.

During the next 2 years, Malaysia’s economy is expected to continue to grow at a faster pace than that of 2002. Malaysia’s GDP is projected to grow at a rate of 5.7% in 2004 and 6.0% in 2005 (International Monetary Fund, 2004§).

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Major Source of Information

The Ministry of Primary Industry
Department of Minerals and Geoscience [Malaysia]
Floor 19th-22nd, Tanbung Haji Bldg.
Jalan Tun Razak, 50658 Kuala Lumpur, Malaysia
Telephone: 60-03-2161-1033
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Internet: www.jmg.gov.my

Major Publications

Department of Statistics [Malaysia]:
Statistical Bulletin, Malaysia, monthly.
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Malaysian Chamber of Mines:
Annual Report, annual.
Malaysia Tin Bulletin, monthly.

Minerals and Geoscience Department [Malaysia]:
Annual Report and Malaysia Minerals Yearbook, annual.
Monthly Statistics on Mining Industry in Malaysia, monthly.
<table>
<thead>
<tr>
<th>Commodity</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum, bauxite, gross weight thousand tons</td>
<td>223</td>
<td>123</td>
<td>64</td>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td>Columbium-tantalum metals, struverite, gross weight</td>
<td>675</td>
<td>969</td>
<td>8,430</td>
<td>2,298</td>
<td>2,619</td>
</tr>
<tr>
<td>Copper, mine output, Cu content, Sabah</td>
<td>4,600</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Gold, mine output, Au content kilograms</td>
<td>3,449</td>
<td>4,026</td>
<td>3,965</td>
<td>4,289</td>
<td>4,739</td>
</tr>
<tr>
<td>Iron ore and concentrate thousand tons</td>
<td>337</td>
<td>259</td>
<td>376</td>
<td>404</td>
<td>597</td>
</tr>
<tr>
<td>Lead metal, secondary</td>
<td>2,770</td>
<td>3,650</td>
<td>4,100</td>
<td>4,722</td>
<td>4,700</td>
</tr>
<tr>
<td>Rare-earth metals, monazite, gross weight</td>
<td>1,147</td>
<td>818</td>
<td>643</td>
<td>441</td>
<td>795</td>
</tr>
<tr>
<td>Silver, mine output, Ag content kilograms</td>
<td>2,744</td>
<td>5</td>
<td>3</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Tin: Mine output, Sn content</td>
<td>7,339</td>
<td>6,307</td>
<td>4,972</td>
<td>4,215</td>
<td>3,359</td>
</tr>
<tr>
<td>Metal, smelter</td>
<td>28,913</td>
<td>26,228</td>
<td>30,417</td>
<td>30,887</td>
<td>4,700</td>
</tr>
<tr>
<td>Titanium: Ilmenite concentrate, gross weight</td>
<td>127,695</td>
<td>124,801</td>
<td>129,750</td>
<td>106,046</td>
<td>95,148</td>
</tr>
<tr>
<td>Dioxide, gross weight</td>
<td>46,000</td>
<td>46,000</td>
<td>50,000</td>
<td>56,000</td>
<td>56,000</td>
</tr>
<tr>
<td>Zirconium, zircon concentrate, gross weight</td>
<td>1,763</td>
<td>3,642</td>
<td>3,768</td>
<td>5,292</td>
<td>3,456</td>
</tr>
<tr>
<td>Barite</td>
<td>13,506</td>
<td>7,274</td>
<td>649</td>
<td>3,082</td>
<td>--</td>
</tr>
<tr>
<td>Cement, hydraulic thousand tons</td>
<td>10,104</td>
<td>11,445</td>
<td>13,820</td>
<td>14,336</td>
<td>17,243</td>
</tr>
<tr>
<td>Clays and earth materials do.</td>
<td>33,083</td>
<td>79,485</td>
<td>29,596</td>
<td>23,000</td>
<td>31,000</td>
</tr>
<tr>
<td>Clays, kaolin</td>
<td>213,973</td>
<td>233,885</td>
<td>364,458</td>
<td>323,916</td>
<td>376,958</td>
</tr>
<tr>
<td>Feldspar</td>
<td>26,940</td>
<td>29,895</td>
<td>40,509</td>
<td>30,819</td>
<td>31,000</td>
</tr>
<tr>
<td>Mica</td>
<td>3,675</td>
<td>3,835</td>
<td>4,107</td>
<td>3,669</td>
<td>3,609</td>
</tr>
<tr>
<td>Nitrogen, N content of ammonia</td>
<td>432,000</td>
<td>604,800</td>
<td>575,105</td>
<td>447,398</td>
<td>450,000</td>
</tr>
<tr>
<td>Silica sand, peninsular Malaysia and Sarawak</td>
<td>508,723</td>
<td>446,838</td>
<td>575,105</td>
<td>447,398</td>
<td>450,000</td>
</tr>
<tr>
<td>Coal</td>
<td>308,502</td>
<td>382,942</td>
<td>497,733</td>
<td>352,513</td>
<td>172,820</td>
</tr>
<tr>
<td>Gas, natural: Gross million cubic meters</td>
<td>51,376</td>
<td>56,929</td>
<td>58,751</td>
<td>60,791</td>
<td>65,173</td>
</tr>
<tr>
<td>Net do.</td>
<td>40,844</td>
<td>45,259</td>
<td>46,707</td>
<td>48,329</td>
<td>51,813</td>
</tr>
<tr>
<td>Liquefied natural gas thousand tons</td>
<td>15,390</td>
<td>15,169</td>
<td>15,423</td>
<td>15,025</td>
<td>17,402</td>
</tr>
<tr>
<td>Petroleum: Crude and condensate thousand 42-gallon barrels</td>
<td>252,115</td>
<td>249,159</td>
<td>243,696</td>
<td>254,770</td>
<td>269,370</td>
</tr>
<tr>
<td>Gasoline do.</td>
<td>25,498</td>
<td>22,205</td>
<td>25,500</td>
<td>26,000</td>
<td>26,950</td>
</tr>
<tr>
<td>Jet fuel do.</td>
<td>7,500</td>
<td>7,500</td>
<td>7,500</td>
<td>7,500</td>
<td>7,500</td>
</tr>
<tr>
<td>Kerosene do.</td>
<td>15,945</td>
<td>19,631</td>
<td>25,522</td>
<td>23,688</td>
<td>24,460</td>
</tr>
<tr>
<td>Diesel do.</td>
<td>43,725</td>
<td>57,559</td>
<td>55,500</td>
<td>57,000</td>
<td>56,000</td>
</tr>
<tr>
<td>Residual fuel oil do.</td>
<td>11,972</td>
<td>12,413</td>
<td>12,500</td>
<td>15,000</td>
<td>14,000</td>
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<tr>
<td>Other do.</td>
<td>15,000</td>
<td>15,500</td>
<td>15,500</td>
<td>15,000</td>
<td>15,000</td>
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</table>

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Major operating companies and major equity owners</th>
<th>Location of main facilities</th>
<th>Annual capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bauxite</td>
<td>Johore Mining and Stevedoring Co. Sdn. Bhd. (ALCAN Ltd. of Canada, 61%; local investors and other, 39%)</td>
<td>Teluk Rumania and Sg. Rengit, Johor</td>
<td>400</td>
</tr>
<tr>
<td>Cement†</td>
<td>Cement Industries of Malaysia Bhd. (United Engineers Malaysia Bhd., 53.97%; others, 46.03%)</td>
<td>Kangar, Perlis</td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td>Lafarge Malayan Cement Bhd. (majority owned subsidiary of Lafarge S.A.)</td>
<td>Rawang, Selangor; Kanthan, Perak, Langkawi, Kedah; and Pasir Gudang, Johor</td>
<td>12,800</td>
</tr>
<tr>
<td></td>
<td>Negeri Sembilan Cement Industries Sdn. Bhd. (wholly owned subsidiary of Cement Industries of Malaysia Berhad)</td>
<td>Bahau, Negeri Sembilan</td>
<td>1,400</td>
</tr>
<tr>
<td></td>
<td>Pahang Cement Sdn Bhd. (50-50 joint venture of Pahang State government and YTL Cement Berhad)</td>
<td>Bukit Sagu, Pahang</td>
<td>1,300</td>
</tr>
<tr>
<td></td>
<td>Perak-Hanjooong Simen Sdn Bhd. (Gopeng Bhd., 45%; Korea Heavy Industries and Construction Co. and others, 55%)</td>
<td>Padang Rengas, Perak</td>
<td>3,400</td>
</tr>
<tr>
<td></td>
<td>Tasek Corp. (publicly owned company)</td>
<td>Ipoh, Perak</td>
<td>2,300</td>
</tr>
</tbody>
</table>

**Gas:**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Major operating companies and major equity owners</th>
<th>Location of main facilities</th>
<th>Annual capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>ExxonMobil Exploration and Production Malaysia, Inc.</td>
<td>Offshore Terengganu</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>do. Sabah Shell Petroleum Co. Ltd.</td>
<td>Offshore Sabah</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>do. Sarawak Shell Bhd.</td>
<td>Offshore Sarawak</td>
<td>80</td>
</tr>
<tr>
<td>Liquefied</td>
<td>Malaysia LNG Sdn. Bhd. (Petronas Nasional Berhad, 65%; Shell Gas N.V., 15%; Mitsubishi Corp., 15%; Sarawak State government, 5%)</td>
<td>Tanjung Kidurong, Bintulu, Sarawak</td>
<td>8,100</td>
</tr>
<tr>
<td></td>
<td>Malaysia LNG Dua Sdn. Bhd. (Petronas Nasional Berhad, 60%; Shell Gas N.V., 15%; Mitsubishi Corp., 15%; Sarawak State government, 10%)</td>
<td>do.</td>
<td>7,800</td>
</tr>
<tr>
<td></td>
<td>Malaysia LNG Yoga Sdn. Bhd. (Petronas Nasional Berhad, 60%; Shell Gas N.V., 15%; Mitsubishi Corp., 15%; Sarawak State government, 10%)</td>
<td>do.</td>
<td>6,800</td>
</tr>
<tr>
<td>Gold, refined</td>
<td>Specific Resources Sdn. Bhd. (joint venture of Pahang State Development Corp. and Avocet Mining plc of the United Kingdom)</td>
<td>Penjom, Pahang</td>
<td>4,000</td>
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</tbody>
</table>

**Iron and steel:**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Major operating companies and major equity owners</th>
<th>Location of main facilities</th>
<th>Annual capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot-briquetted iron</td>
<td>Amsteel Mills Sdn. Bhd. (wholly owned subsidiary of Amsteel Corp.)</td>
<td>Labuan Island, offshore Sabah</td>
<td>800</td>
</tr>
<tr>
<td>Direct-reduced iron</td>
<td>Perwaja Steel Sdn. Bhd. (Maju Holdings Sdn. Bhd., 51%; Lion Group, 30%; Terengganu State government, 19%)</td>
<td>Kerteh, Terengganu</td>
<td>1,200</td>
</tr>
<tr>
<td>Crude steel</td>
<td>Amsteel Mills Sdn. Bhd. (wholly owned subsidiary of Amsteel Corp.)</td>
<td>Klang, Selangor</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>Perwaja Steel Sdn. Bhd. (Maju Holdings Sdn. Bhd., 51%; Lion Group, 30%; Terengganu State government, 19%)</td>
<td>Kerteh, Terengganu</td>
<td>800</td>
</tr>
</tbody>
</table>

**Nitrogen, ammonia**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Major operating companies and major equity owners</th>
<th>Location of main facilities</th>
<th>Annual capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen, ammonia</td>
<td>Asean Bintulu Fertilizer Sdn. Bhd. (Petronas Nasional Berhad, 63.5%; P.T. Pupuk Srawidjaja Indonesia, 13%; Thai Ministry of Finance, 13%; Philippines National Development Co., 9.5%; Singapore Temasek Holdings Pte. Ltd., 1%)</td>
<td>Bintulu, Sarawak</td>
<td>395</td>
</tr>
<tr>
<td></td>
<td>PETRONAS Fertilizer Kedah Sdn. Bhd. (wholly owned subsidiary of Petronas Nasional Berhad)</td>
<td>Gurun, Kedah</td>
<td>378</td>
</tr>
<tr>
<td></td>
<td>PETRONAS Ammonia Sdn Bhd. (wholly owned subsidiary of Petronas Nasional Berhad)</td>
<td>Kerth, Terengganu</td>
<td>370</td>
</tr>
<tr>
<td>Petroleum, crude</td>
<td>ExxonMobil Exploration and Production Malaysia, Inc.</td>
<td>Offshore Terengganu</td>
<td>390</td>
</tr>
<tr>
<td></td>
<td>do. Sabah Shell Petroleum Co. Ltd.</td>
<td>Offshore Sabah</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>do. Sarawak Shell Bhd.</td>
<td>Offshore Sarawak</td>
<td>184</td>
</tr>
</tbody>
</table>

See footnote at end of table.
## TABLE 2--Continued
**MALAYSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2003**

(Thousand metric tons unless otherwise specified)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Major operating companies and major equity owners</th>
<th>Location of main facilities</th>
<th>Annual capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum, crude--Continued: thousand 42-gallon barrels per day</td>
<td>Sarawak Shell Bhd.</td>
<td>Offshore Sarawak</td>
<td>184</td>
</tr>
<tr>
<td>Do. PETRONAS Carigali Sdn. Bhd.</td>
<td></td>
<td>Offshore Terengganu</td>
<td>22</td>
</tr>
<tr>
<td>Do. Murphy Sarawak Oil Co. Ltd.</td>
<td></td>
<td>Offshore Sarawak</td>
<td>15</td>
</tr>
<tr>
<td>Tin: Tin concentrate Delima Industries Sdn. Bhd.</td>
<td>Dengkil, Selangor</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Do. Maiju Sama Sdn. Bhd.</td>
<td>Puchong, Selangor</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Do. New Lahat Mines Sdn. Bhd.</td>
<td>Lahat, Perak</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Do. Omsam Telecommunication Sdn. Bhd.</td>
<td>Bakap and Batu Gajah, Perak</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Do. Rahman Hydraulic Tin Bhd.</td>
<td>Klian Intan, Perak</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Do. S.E.K. (M) Sdn. Bhd.</td>
<td>Kampar, Perak</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Do. Tasek Abadi Sdn Bhd.</td>
<td>Senu and Kampar, Perak</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Refined Malaysia Smelting Corp. Bhd. (The Straits Trading Co. Ltd., 37.44%; Malaysia Mining Corp., 37.44%; others, 25.12%)</td>
<td>Butterworth, Penang</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Titanium, dioxide Huntsman Tioxide Sdn. Bhd. (a subsidiary of HuntsmanTioxide of the United Kingdom)</td>
<td>Kemaman, Terengganu</td>
<td>56</td>
<td></td>
</tr>
</tbody>
</table>

*All companies operated integrated plants. Annual capacity is for cement production; an asterisk (*) denotes the clinker capacity.*