

THE MINERAL INDUSTRY OF

MALAYSIA

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Malaysia's mineral resources include antimony, barite, bauxite, clays, coal, copper, gold, titanium, iron ore, lead, limestone, natural gas, crude petroleum, rare earths, silica, silver, thorium, tin, tungsten, and zinc. Over the past three decades, most identified resources of barite, bauxite, copper, gold, iron ore, kaolin, limestone, silica, and tin had been exploited, but resources of coal, lead, and zinc remained largely undeveloped. The minable copper reserves at the Mamut Mine in Ranau, Sabah, were almost depleted, after 23 years of mining in the area. The high-grade tin reserves in the States of Johor, Perak, and Selangor were greatly reduced, after 35 years of intensive mining in those three States. However, Malaysia still had the world's second largest tin reserves. More active exploration for oil and gas offshore the States of Sarawak, Sabah, and Terengganu in the past 10 years had resulted in a substantial increase in proven reserves of natural gas and crude petroleum. Malaysia's proven reserves of natural gas and crude petroleum ranked 11th and 25th largest in the world, respectively (Oil & Gas Journal, 1998).

In 1998, the Government of Malaysia, through its Geological Survey Department, and several private domestic and foreign companies continued to explore for clays, coal, base metals, and gold, mainly in the States of Kelantan, Pahang, Sabah, and Sarawak. Encouraged by the introduction of a new type of production-sharing contract, many foreign oil companies were more actively exploring for oil and gas exploration offshore the States of Sabah, Sarawak, and Terengganu. There had been no development of significant nonferrous metal mines but only a few small-scale gold and industrial minerals mines were developed and began production in the past 3 years.

In 1998, Malaysia's financial market as well as the general economy had been severely affected by the Asian financial crisis. Between June 1997 and July 1998, Malaysia's national currency depreciated by 39% and its stock market dropped 62%. According to the Malaysia's Department of Statistics, the value of the Ringgit Malaysian (RM) depreciated to RM 4.15 from RM 2.52 against US\$1.00 in the local currency markets. The composite index fell to 402.65 from 1,077.30 at the Kuala Lumpur Stock Exchange. To eliminate the internationalization of the RM and insulate Malaysia from the region's financial turmoil, the Government imposed the so-called selective exchange controls on September 1, 1998. Beginning on September 2, 1998, the Government pegged RM 3.80 to US\$1.00, banned trading the RM abroad, and set a lock-in period for overseas investors in the Malaysian stock market. These capital control measures were to allow the Government to lower the interest rates and stimulate the Malaysian economy

without worrying about the outflows of short-term capital and the continuing instability of the RM (Chen, 1999).

Despite the Government's capital control and other monetary measures, Malaysia's economy went into recession in 1998 after reporting three consecutive quarters of decline in its gross domestic product (GDP). According to the Department of Statistics, Malaysia's GDP, in 1978 prices, contracted 6.7% in 1998, compared with a positive growth of 7.7% in 1997. Industrial production, as measured by Overall Industrial Index, decreased 7% in 1998, compared with an increase of 10.6% in 1997. The unemployment rate rose to 3.9% in 1998 from 2.6% in 1997. Inflation, as measured by the Consumer Price Index, rose to 5.3% from 2.7% in 1997. However, Malaysia's external debt decreased to \$42.1 billion in 1998 from \$43.8 billion in 1997. The output of the mining sector, which contributed 7% to Malaysia's GDP, grew 0.8% in 1998, compared with 1.0% growth in GDP in 1997. Increased output of the mining sector was attributed mainly to the higher output of crude petroleum and tin. Malaysia's GDP, in the 1978 price, was estimated to be \$34.5 billion, of which the mining sector accounted for \$2.5 billion in 1998 (Central Bank of Malaysia, 1999).

In 1998, Malaysia's minerals production included barite, bauxite, coal, copper, dolomite, feldspar, gold, ilmenite, iron ore, kaolin, limestone, mica, monazite, natural gas, crude petroleum, sand and gravel, silica, silver, tin, and zirconium. Production of important value-added mineral products included cement, liquefied natural gas (LNG), nitrogen fertilizer materials (ammonia and urea), refined petroleum products, crude steel, titanium dioxide pigment, and refined tin.

Production of coal, iron ore, and tin increased. Production of industrial minerals for building materials decreased because of a significant slowdown in the construction industry. Production of bauxite, copper, gold, and most other minerals also was at a lower level than that of 1997 because of the depressed world raw materials market. Production of natural gas decreased, while crude petroleum output increased. (*See table 1.*)

In 1998, Malaysia was the third largest producer and exporter of refined tin and LNG in the world. Malaysia was one of the important producers and suppliers of bauxite, copper, ilmenite, kaolin, monazite, and crude petroleum in the Asia and Pacific region. Malaysia would no longer be a copper producer in the region, after the Mamut Copper Mining Sdn. Bhd. (MCM) ceased its mining operations in June 1999.

In 1998, Malaysia remained a net exporter of mineral products. Bauxite was exported mainly to Japan and the United States. All copper concentrate was exported to Japan. Ilmenite was exported mainly to France, Japan, and the Republic of

Korea. Refined tin was exported mainly to India, Italy, Japan, the Republic of Korea, the Netherlands, Taiwan, and the United Kingdom. LNG and crude petroleum were exported mainly to the Republic of Korea and Japan. Malaysia was a minor supplier of bauxite, crude petroleum, and refined tin to the United States.

According to Malaysia's Department of Statistics, total export earnings increased 29.8% to \$75.5 billion in 1998, of which crude petroleum and refined petroleum products accounted for 3.7% and natural gas (in the form of LNG) accounted for 2.4%. The export earnings from refined tin, copper concentrate, and other minerals, such as bauxite, clays, ilmenite, iron ore, kaolin, monazite, silica, and zircon concentrate, accounted for about 0.4% of the total exports. Total import bills increased only 3.3% to \$60.1 billion in 1998, of which imports of crude petroleum and refined petroleum products accounted for 2.5%. The import bills of all other mineral commodities, such as coal, gypsum, iron ore, phosphate rock, and potash, accounted for 1.2% of the total imports. In 1998, Malaysia recorded a trade surplus of \$15.4 billion owing to depreciation of its RM, which made Malaysia's commodities more competitive in the world market.

The structure of Malaysia's mineral industry changed slightly in 1998. The grinding capacity of the cement industry increased to 22.6 million metric tons per year (Mt/yr). The capacity of the LNG industry was expected to increase by 6.8 Mt/yr to 22.7 Mt/yr by 2001. Production capacity of natural gas was expanded in the oil- and gasfields offshore of Terengganu. (See table 2.) However, a tin smelter in George Town, Penang, ceased operations at the end of March 1998, and the country's only copper mine at Mamut in Ranau, Sabah, was scheduled to be closed at the end of June 1999. According to the latest Labor Force Survey conducted by Malaysia's Department of Statistics, as of September 1998, the total number of persons employed by the mining and quarrying industries was estimated at 25,400 or about 0.3% of the total employment of 8,464,000. Malaysia's labor force totaled 8,752,800, of those 3.3% were unemployed.

In the metallic minerals sector, mine production of bauxite was by Johore Mining and Stevedoring Co. Sdn. Bhd. (JMSC) from its open pit mine at Teluk Ramunia, Johor, and by Lembaga Kemajuan Johor Tenggara from its open pit mine at Sungai Rengit, Johor. JMSC operated a processing plant with a capacity of 400,000 metric tons per year (t/yr) of washed bauxite at the Bukit Raja area near Pengerang Highway, north of Sungai Rengit and east of Johore Bahru. Most of the washed chemical- and refractory-grade bauxite was exported to Japan and the United States and the cement-grade bauxite was sold to the domestic cement manufacturers as raw materials.

In April, an unnamed Australian company announced that it planned to build an alumina refinery at Similajau, near Bintulu in Sarawak. According to a local press report, the alumina refinery project would involve a total investment of about \$2.6 billion and would take about 5 years to complete. The project would create about 11,000 jobs. Similajau was selected for the plant site because of its close proximity to Bintulu, where two large LNG plants are located (New Straits Times, April 25, 1998, RM 10 billion alumina refinery to be set up in Sarawak,

accessed September 30, 1998, at URL <http://www.cmsb.com.my/news/news98/ap25nst1.htm>).

Mine production of copper by the MCM at the Mamut Mine near Ranau in Sabah decreased considerably from that of 1997 owing to reduced minable reserves. After more than 23 years of operations, Mega First Corp. Bhd., the parent company of MCM and owner of the mine, decided to close the mine 1 year earlier than the originally scheduled date in 2000 because of economic and safety reasons. Low copper prices and reduced minable reserves resulting from several landslides at the mine site during the rainy season were cited as the reasons for the early mine closure (Mining Journal, 1999). Production of copper concentrate in 1998 was estimated at 61,700 metric tons (t). Copper contained in the concentrate was about 14,200 t plus about 850 kilograms (kg) of gold and 7,100 kg of silver. All copper concentrate was transported by truck to Usukan Port in Kola Belud, about 115 kilometers (km) from the mine site, then loaded onto bulk carriers for export to Japan. According to the Department of Mines, the number of employees at the mine was reduced to 946 in September from 1,071 in January 1998. The company's comprehensive plan to convert the mine site into an integrated tourist resort had been submitted to the authorities in 1997.

Mine production of gold decreased in 1998 because of reduced number of productive gold mines operated in the States of Kelantan, Pahang, and Terengganu and lower gold production as a byproduct of copper mining at the Mamut Mine in Sabah. Of the total gold produced in 1998, about 75% was from primary gold mines, and 25% as a byproduct of copper mining in Sabah and tin mining in the State of Perak and Selangor. According to the Department of Mines, the number of operating gold mines decreased to 5 in September from 10 in January 1998, and the workforce of gold mines decreased to 442 in September from 459 in January 1998.

Avocet Mining PLC of the United Kingdom, through its wholly owned subsidiary Avocet Gold Ltd., operated the Penjom Gold Mine at Empang Jalih in Kuala Lipis, Pahang. According to the company annual report, the monthly gold production averaged about 130 kg, which was about 48% less than the average monthly production of 250 kg reached during April and May 1997. The lower recovery rate of about 60% resulting from treatment of the carbonaceous ores in 1998 was expected to be improved by maximizing gravity recovery and by a batch process of resin-in-leach of poisoned flotation concentrates in 1999. Ore reserves at the Penjom property, estimated by the company at the end of September 1998, were 6.2 million metric tons (Mt), grading 3.9 grams of gold per metric ton (Avocet Mining PLC, December 8, 1998, 1998 annual report and accounts—Chairman's statement, accessed June 7, 1999, at URL <http://www.avocet.co.uk/archir.htm>). Gold production in 1998 from the Penjom Mine was estimated at 1,520 kg.

In 1998, Avocet Mining acquired 62.6% interest in Damar Consolidated Exploration Sdn. Bhd. (DCE) with an option to purchase the outstanding shares. DCE is a Malaysian exploration company exploring for gold in the Blocks 3 and 6 in western Pahang. After the acquisition, Avocet Mining had conducted geochemical sampling and diamond drilling.

Encouraging results were reported in the Sungai Selinsing area (Avocet Mining PLC, October 14, 1998, Damar Consolidated Exploration Sdn. Bhd., press release, accessed May 26, 1999, at URL <http://www.avocet.co.uk/ardamar.htm>).

According to Malaysia's Geological Survey, Raub Australian Gold Sdn. Bhd., a joint venture of Akay Holding Sdn. Bhd. and Wells Gold Corp. NL of Australia, had signed an agreement to develop a 26-hectare gold tailing site at Bukit Koman in Raub district of Pahang. TRA Mining (M) Sdn. Bhd. was to develop a gold mine at Sungai Koyan in Pahang. In addition, Gladioli Enterprise Sdn. Bhd., Southern Gold Mining Development Sdn. Bhd., and Syarikat Tabai Sdn. Bhd. were expected to develop new gold mines in the Bau District of Sarawak (Geological Survey Department, Malaysia, 1997).

Production of iron ore increased sharply owing to increased number of operating mines in 1998. According to Malaysia's Department of Mines, iron ore production was from 9 small-scale mines operated in the States of Johor, Kedah, Pahang, Perak, and Terengganu with a total workforce of about 120. The average ore grade was about 64% iron. Most of iron ore production was consumed domestically by Malayawate Steel Bhd. To meet the raw material requirements for its iron and steel industry, Malaysia imported 2.6 Mt of iron ore in 1997, but iron ore imports dropped to about 1 Mt in 1998 owing to a significant slow down in domestic steel demand by the construction industry and lower demand for direct-reduced iron in the overseas market. Imported iron ore was consumed by two direct-reduction iron plants operated by the State-owned Perwaja Steel Sdn. Bhd. (PS) in Kemaman, Terengganu, and Ansteel Mills (formerly the Sabah Gas Industries) on Labuan Island, offshore Sabah.

PS, Malaysia's major integrated steel producer, had been privatized with Maju Holdings Sdn. Bhd. holding 51%; the Lion Group, 30%; and the State Government of Terengganu 19% (Metal Bulletin, 1998b). Maju Holding took over the management of steelmaking in late 1996, when PS was in financial difficulties with a cumulative loss of about \$1.2 billion. After more than 2 years of operations, the company had been adversely affected by the slowdown in the Malaysia economy in 1998. The company reportedly experienced tight cash flow and was having problems continuing operations because of increased cost of imported raw materials resulting from the RM depreciation and sharply lower demand for steel in 1998. As a result, the company was unlikely to meet its targeted profit of \$52.6 million in 2000 (Business Times, 1998, Perwaja faces tight cash flow but is managing, accessed November 18, 1998, at URL http://cnfnfn.news-real.com/story/19981117/03/44/1037579_st.html). Gunawan Iron and Steel Sdn. Bhd., the other integrated steel producer, brought on-stream a 1 Mt/yr-blast furnace steel plant at the Telok Kalong Industrial Estate in Kemaman, Terengganu in the fall of 1998 (Metal Bulletin Monthly, 1998).

Because of higher tin prices, the output of tin rebounded to a 3-year high in 1998. The monthly average price of tin on the Kuala Lumpur Tin Market (KLTM) stayed between RM 19.84 per kilogram and RM 23.27 per kilogram in 1998. Depreciation of the RM against the U.S. dollar had boosted the tin price over the RM 20 per kilogram level on the KLTM in 1998.

Encouraged by the higher tin prices, according to All Malay Chinese Mining Association, many tin miners were thinking of reopening their closed mines (Mining Journal, 1998). In August, the Government issued 11 new tin mining licenses, which brought the total number of tin mining licenses in Malaysia to 50. According to the Malaysian Chamber of Mines, the State government was more willing to issue licenses because tin mining became more profitable than before and would bring in more tax revenues. In an effort to revive the tin mining industry, the Chamber of Mines submitted a proposal to promote mining of offshore tin deposits and requested issuing licenses to mine new grounds rather than to reopen the closed mines (Platt's Metal Week, 1998a).

Petaling Tin Bhd., one of the major tin mining companies in Malaysia, was asked by the Kuala Langat Land and District office to surrender its mining leases in 1998. According to the company, it had stopped tin mining at two of its tin mines in the State of Selangor in late 1997. Petaling Tin had three mining leases in the State of Selangor and two of those will expire in 2004 and the third in 2014 (Platt's Metals Week, 1998b). On the other hand, the Sungei Lembing underground tin mine, the country's largest lode tin complex, reportedly was to be revived in 1999 (Financial Times, 1998).

According to the Department of Mines, the total number of operating tin mines decreased to 35 in September from 37 in January 1998. The tin mining industry's labor force increased to 1,718 in September from 1,560 in January 1998. To supplement the short fall of domestically produced tin ore and concentrate for the raw material requirements for its tin smelters, Malaysia imported 21,961 t of tin in concentrates mainly from Australia, Bolivia, Peru, and Portugal. Imports of tin ore and concentrate decreased by 28% because of the closure of Escoy Smelter at the end of March 1998.

Production of refined tin was by Escoy Smelting Sdn. Bhd. and Malaysia Smelting Corp. Bhd. The Escoy Smelting in George Town on the island of Penang closed its tin smelter at the end of March 1998 and transferred its operations to the Thaisarco tin smelter in Phuket, Thailand. The Amalgamated Metals Corp. of the United Kingdom, which owned 50.5% of Escoy Smelting, had acquired the Thaisarco smelter in 1995 (Metal Bulletin, 1998a). The Malaysia Smelting operated a 40,000-t/yr smelter across the channel from George Town in Butterworth. To supplement its raw material requirements, Malaysia Smelting imported tin concentrates mainly from Australia, Bolivia, Peru, and Portugal. The company also operated a 360-t/yr electrolytic, high-purity tin refinery at the smelter site. According to information provided by the company, this high-purity, premium-grade refined tin contains 99.995% tin, 0.0006% arsenic, 0.0027% lead, 0.0004% bismuth, 0.0004% copper, 0.0007% antimony, 0.0001% each for indium and iron, and less than 0.0001% each for aluminum, cadmium, cobalt, nickel, silver, and zinc.

Domestic demand for refined tin dropped to 5,453 t in 1998 from 6,586 t in 1997. The major domestic tin consumer remained the solder industry, accounting for 60% of the total demand, followed by the tin-plating industry, 11%; the pewter industry, about 11%; and others, 18%. Exports of refined tin dropped to 22,376 t in 1998 from 31,785 t in 1997. Export

earnings from tin were \$127.5 million in 1998, compared with \$170 million in 1997. The main buyers of Malaysian refined tin were, in decreasing order, the Netherlands, Italy, Japan, the United Kingdom, India, the Republic of Korea, and Taiwan. Exports of refined tin to the United States was 758 t, which was accounted for only 3.4% of Malaysia's tin exports in 1998.

In the industrial minerals sector, production of limestone, construction aggregates, and sand and gravel was at a lower level than that of 1997, owing to a significant slowdown in the construction activity, resulting from a sharp reduction in civil engineering works associated with the deferment of large infrastructure projects and the postponement of nonresidential building projects. Other important industrial minerals produced in Malaysia included barite, feldspar, ilmenite, kaolin, mica, monazite, silica, and zircon. The output of these industrial minerals were lower than those of 1997 owing to a weaker demand by the industrial sector of Malaysia and other Asian countries.

Malaysia's cement production dropped 18% because of reduced domestic demand in 1998. According to an estimated by the Malaysian Cement Association, domestic demand for cement decreased to 11.4 Mt in 1998 from 17.5 Mt in 1997, owing to a slowdown in the country's construction and real estate industries, which had been adversely affected by higher interest rates and lower demand for new property since the second half of 1997. Because of falling domestic demand for cement, the export ban was removed by the Government and about 620,000 t of surplus cement was exported in 1998. On the other hand, cement imports dropped to 170,000 t in 1998 from 3,600,000 t in 1997.

The capacity of Malaysia's cement industry, however, continued to expand in 1998. Tasek Cement Bhd. and Perak-Hanjoong Simen Sdn. Bhd. were about 50% complete on expansion of their grinding capacity by 0.8 Mt and 1.5 Mt, respectively. According to the industry estimates, the total grinding capacity was expected to reach 22.6 Mt/yr by yearend 1998 from 19.4 Mt/yr in 1997 (International Cement Review, 1998).

Because of falling demand, rising debt, and uncertain cement market, the two major owners of Kedah Cement (KC), Hicom Holdings Bhd., and Bolton Bhd. sold their interests of 36.03% and 28.99%, respectively, to Malaysia Cement Bhd. (MCB) for a total of about \$270 million in November 1998. MCB, which already owned 58% interest in Associated Pan Malaysia Cement Sdn. Bhd. (APMC) also bought the remaining interest in APMC from Pan Malaysia Cement Work Bhd. in October. As a result, MCB now owned 65.02% of KC and 100% of APMC in 1998. In turn, MCB was 58% owned by the Blue Circle Industries plc of the United Kingdom. Blue Circle Industries, the largest cement company in the United Kingdom, effectively controls about 48% of the Malaysian cement market (Industrial Minerals, 1998).

In the mineral fuels sector, Malaysia produced a small quantity of coal in Sarawak and imported about 3 Mt of coal to meet the requirements for its cement and utility industries. Malaysia, however, was a net exporter of oil and gas. Malaysia has substantial reserves of natural gas and considerable reserves of crude petroleum. Its proven reserves of natural gas were

estimated to be 2.31 trillion cubic meters, accounting for 1.59% of the world total and its proven reserves of crude petroleum were estimated to be 3.9 billion barrels, accounting for 0.38% of the world total in 1998 (Oil & Gas Journal, 1998).

In oil and gas exploration and development, the state-owned Petroliam Nasional Bhd. (PETRONAS) signed production-sharing contracts (PSC) with four major foreign oil companies under new terms called Revenue-Over-Cost (R/C) in 1998. Under the R/C concept, cost-cap and profit-splits vary according to the ratio of revenues and costs. The Government introduced the R/C concept in 1997 to promote and attract investments in exploration and production activities. In 1998, five foreign companies signed new PSC's with the Government with R/C terms. The five companies were Amerada Hess Corp. for Blocks PM 304 and SK 306 offshore Terengganu and Sarawak, respectively; Sarawak Shell Bhd. for Blocks SK 308, E 6, F 14, and F 28 offshore Sarawak; Santa Fe Energy Resources, Inc. for Block PM 308, offshore Terengganu; and YPE Malaysia Ltd. and Mitsubishi Corp. for Block SK 301 offshore Sarawak.

In 1998, PETRONAS signed a major gas PSC with Esso Production Malaysia Inc. (EPMI) for the development of 22 gasfields offshore Terengganu to provide 36.8 million cubic meters per day (Mm^3/d) of natural gas supply to Peninsular Malaysia for 25 years beginning in year 2002. The gas reserves in the 22 gasfields were estimated to be 340 billion cubic meters (Petroleum Economist, 1998). PETRONAS also signed an agreement with the Malaysia-Thailand Joint Authority (MTJA) to purchase 11 Mm^3/d of natural gas from Block A-18 in the Malaysia-Thailand Joint Development Area (JDA) in the Gulf of Thailand. The first delivery would be in 2001 and later from Blocks B-17 and C-19 also in the JDA. JDA is governed by MTJA. Natural gas reserves on Block A-18, operated by the joint venture of PETRONAS-Carigali Sdn. Bhd. (PCSB) and Triton Energy Corp. of the United States, were estimated to be 283 billion cubic meters. Natural gas reserves on Block B-17, operated by the Petroleum Authority of Thailand and PCSB, were estimated to be 85 billion cubic meters (Oil & Gas Journal, 1997).

Production of natural gas decreased slightly in 1998. Natural gas production was mainly from gasfields offshore Sabah, Sarawak, and Terengganu. About 25.5 Mm^3/d of natural gas, produced by PCSB and EPMI from the gasfields offshore Terengganu, was delivered to the gas-processing plants in Kerteh. The processed natural gas was then delivered by pipeline as fuel to the end-users, which included households, manufacturers, and power companies, as well as feedstock to petrochemical plants in Peninsular Malaysia and Singapore. About 2.8 Mm^3/d of natural gas, produced by Sabah Shell Petroleum Co. Ltd. from the gasfields offshore Sabah, was delivered to the processing plant on Labuan Island. The processed natural gas was then delivered to the methanol plant as feedstock and to the direct-reduction iron plant as fuel on Labuan Island. About 77 Mm^3/d of natural gas, produced by PCSB and Sarawak Shell Bhd. from the gasfields offshore Sarawak, was delivered to two LNG plants and the ammonia and urea plants in Bintulu for the production of LNG and nitrogen fertilizers.

Production of LNG by Malaysia LNG Sdn. Bhd. (MLNG) and Malaysia LNG Dua Sdn. Bhd. (MLNG-2), both at Bintulu in Sarawak, was 14.7 Mt in 1998, compared with 15.3 Mt in 1997. All the LNG production by MLNG was exported to Japan under a 20-year contract with the Japanese utilities companies. The LNG production by MLNG-2 was exported to various energy companies in Japan, the Republic of Korea, and Taiwan under long-term contracts. Production of ammonia and urea by Asean Bintulu Fertilizer Sdn. Bhd. (ABF) at Bintulu in Sarawak, in nitrogen content, was 351,400 t and 292,000 t, respectively in 1998. About 313,000 t of ammonia and 84,000 t of urea were delivered to home markets and about 37,000 t of ammonia and 177,000 t of urea were exported. In June 1997, ABF awarded a contract to Krupp Uhde of Germany to raise the capacity of ammonia and urea to 432,000 t/yr from 326,000 t/yr and to 648,000 t/yr from 277,000 t/yr, respectively (ASIAFAB, 1998).

Malaysia's crude petroleum production, including condensate, averaged 726,100 barrels per day (bbl/d), slightly higher than the 1997 average of 714,209 bbl/d. The total crude petroleum output capacity was about 752,000 bbl/d in 1998. Crude petroleum was produced from 16 oil and gasfields offshore Terengganu, operated by PCSB and EPMI; 9 oil and gasfields offshore Sarawak, operated by Sarawak Shell Bhd. (SSB); and 8 oil and gasfields offshore Sabah, operated by Sabah Shell Petroleum Co. Ltd. (SSP). About 60% of crude petroleum output was from EPMI and a joint venture of EPMI and PCSB from oil and gasfields offshore Terengganu. The remaining 40% was from SSP, SSB, and a joint venture of SSB and PCSB from oil and gasfields offshore Sarawak and Sabah. The major oil and gasfields developed and operated by PCSB and the three foreign oil companies—EMPI, SSP, and SSB, were the Dulang Oilfield, the Duyong Gasfield, and the PM-9 Oil- and Gasfields offshore Terengganu, on the East Coast of Peninsular Malaysia; nine oilfields in the Baram Delta region, offshore Sarawak; and the Tembungo Oilfield and the Samarang Oilfield, offshore Sabah. In late 1997, the Kinabalu, Bunga Kekwa, and Lawit Oilfields came on-stream.

Malaysia exported about 53% of its crude petroleum output in 1998. Exports of crude petroleum were mainly to Japan, the Republic of Korea, Singapore, and Thailand. Malaysia imported more than 55,000 bbl/d of heavy crude oil to meet the requirement for its domestic oil refineries in 1998.

Malaysia had six oil refineries with a total capacity of 465,000 bbl/d in 1998. PETRONAS operated a 100,000-bbl/d refinery at Melaka on the West Coast of Peninsular Malaysia and a 40,000-bbl/d refinery at Kertik on the East Coast of Peninsular Malaysia. Esso operated an 75,000-bbl/d refinery at Port Dickson on the West Coast of Peninsular Malaysia. Shell operated a 105,000-bbl/d refinery also at Port Dickson and a 45,000-bbl/d refinery at Lutong in East Malaysia. PETRONAS (45%), in joint venture with CONOCO Asia Ltd. of the United States (40%), and Statoil, the state oil company of Norway (15%), brought on-stream a 100,000-bbl/d refinery at Melaka on the West Coast of Peninsular Malaysia in 1998. This new oil-refining complex has a 62,000-bbl/d vacuum distillation unit, a 26,000-bbl/d catalytic cracker, a 28,500-bbl/d hydrocracker, a 35,000-bbl/d desulfurization unit, and a

21,000-bbl/d coker (PETRONAS, November 17, 1998, Domestic activities: Downstream, accessed December 8, 1998, at URL <http://www.petronas.com.my/petronas/domestic/downstrm/domdwns.html>).

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The Ministry of Primary Industry:
 Department of Mines, Malaysia
 22nd Floor, Tabung Haji Bldg.
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 Telephone: 60-3-261-1400
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 Jalan Tun Razak, 50736 Kuala Lumpur, Malaysia
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 Fax: 60-3-261-1036

Major Publications

Department of Mines, Malaysia:
 Bulletin on Mining Statistics, quarterly and
 Statistics on Mining Industry in Malaysia, monthly.

Geological Survey Department, Malaysia:
 Annual Report and Malaysia Minerals Yearbook, annual.

Department of Statistics, Malaysia:
Statistical Bulletin, Malaysia, monthly.
Statistical Bulletin, Sabah, annual.

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TABLE 1
MALAYSIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1994	1995	1996	1997	1998 p/	
METALS						
Aluminum, bauxite, gross weight	thousand tons	162	184	219	279	160
Copper, mine output, Cu content (Sabah)		25,267	20,751	20,219	18,821 r/	14,367
Gold, mine output, Au content 3/	kilograms	4,085	3,161	2,829	4,488	3,394
Iron and steel:						
Iron ore and concentrate	thousand tons	243	202	325	269	380
Steel, crude	do.	2,046	2,450	3,216	2,962 r/	1,850
Lead metal, secondary		33,200	33,600	36,000	42,000 r/	35,000
Manganese, gross weight		--	37,600	--	--	--
Rare-earth metals, monazite, gross weight		426	822	618	767 r/	700 e/
Silver, mine output, Ag content 3/	kilograms	13,342	11,079	9,720	9,647	7,285
Tin:						
Mine output, Sn content		6,458	6,402	5,175	5,065	5,756
Metal, smelter		37,990	39,433	38,051	38,400 r/	27,900
Titanium:						
Ilmenite concentrate, gross weight		116,696	151,680	244,642	167,504	124,689
Dioxide e/		36,000	43,000	46,000	46,000	46,000
Zirconium, zircon concentrate, gross weight		1,656	3,790	4,511	4,050	4,000 e/
INDUSTRIAL MINERALS						
Barite		17,144	16,966	17,458	2,608	1,333
Cement, hydraulic	thousand tons	9,928	10,713	12,349	12,668 r/	10,397
Clays, kaolin		252,628	211,182	209,562	187,411	176,521
Feldspar		25,000	27,850	13,983	9,779 r/	10,000 e/
Mica		4,993	5,848	5,501	5,708	3,642
Nitrogen, N content of ammonia		313,300	332,800	328,600	243,200	351,400
Sand and gravel	thousand tons	725,756	695,859	1,168,294	949,948 r/	850,000 e/
Silica sand (Peninsular Malaysia and Sarawak)		245,524	287,515	268,800	205,000	162,201
Stone:						
Dolomite		37,700	28,100	16,500	8,870	7,500 e/
Limestone	thousand tons	22,512	22,260	27,905	25,467 r/	22,000 e/
MINERAL FUELS AND RELATED MATERIALS						
Coal	do.	174	112	83	100 r/	350
Gas, natural: 4/						
Gross	million cubic meters	30,284 r/	36,485	44,092 r/	50,191 r/	49,333
Net 5/	do.	24,409 r/	29,022	35,053 r/	39,902 r/	39,220
Liquefied natural gas	thousand tons	8,276	9,923	13,132	15,600	14,670
Petroleum: 4/						
Crude	thousand 42-gallon barrels	238,491	257,471	261,234	260,686	265,027
Refinery products:						
Gasoline	do.	15,879	19,076	19,675	20,354 r/	19,700 e/
Jet fuel e/	do.	3,200	7,700	7,665 r/	7,800 r/	7,500
Kerosene	do.	12,026	14,547	16,862	17,381 r/	16,600 e/
Diesel	do.	38,490	44,148	47,183	50,668 r/	44,500 e/
Residual fuel oil	do.	14,416	15,364	18,611	20,997 r/	16,900 e/
Other e/ 6/	do.	14,000	15,000	17,000	15,700	15,000
Total e/ 7/	do.	98,000	116,000	127,000	133,000 r/	120,000 e/

e/ Estimated. p/ Preliminary. r/ Revised.

1/ Table includes data available through June 16, 1999.

2/ In addition to the commodities listed, a variety of crude construction materials including clays and stone, fertilizers, and salt is produced, but not reported and available information is inadequate to make reliable estimates of output levels.

3/ Includes byproduct from copper mine in Sabah and tin mines in Peninsular Malaysia, gold mines in Peninsular Malaysia and Sarawak.

4/ Includes production from Peninsular Malaysia, Sabah, and Sarawak.

5/ Gross less volume of reinjected and flared.

6/ Includes LPG, naphthas, and lubricants.

7/ Data are rounded to three significant digits; may not add to totals shown.

Sources: Ministry of Primary Industry, Department of Mines (Kuala Lumpur). Monthly Statistics on Mining Industry in Malaysia, Monthly, 1998. Mining Statistics, Quarterly Bulletin, 1998. Geological Survey Department (Kuala Lumpur). Malaysian Minerals Yearbook 1997.

TABLE 2
MALAYSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 1998

(Thousand metric tons unless otherwise specified)

Commodity		Major operation companies and major equity owners	Location of main facilities	Annual capacity
Bauxite		Johore Mining and Stevedoring Co. Sdn. Bhd. 61% owned by Aluminium Ltd. of Canada, 39% by local investors and others)	Bukit Raja-Pengerang, Johor	400
Cement		Associated Pan Malaysia Cement Sdn. Bhd. (100% owned by Malaysia Cement Bhd.)	Rawang, Selangor and Kantan, Perak	6,100
Do.		Cement Industries of Malaysia Bhd. (publicly owned company)	Kangar, Perlis	2,000
Do.		Kedah Cement Holdings Bhd. (65.02% owned by Malaysia Cement Bhd. and minority by general public shareholders)	Langwai, Kedah	5,800
Do.		Perak-Hanjoong Simen Sdn. Bhd. (60% owned by Korea Heavy Industries and Construction Co., and 40% by Perak State government)	Padang Rengas, Perak	1,440
Do.		Tasek Cement Bhd. (publicly owned company)	Ipoh, Perak	1,500
Do.		Pahang Cement Sdn Bhd. (joint venture of Pahang State government and Yeoh Toing Lay Sdn. Bhd.)	Bukit Sagu, Pahang	1,300
Copper, concentrate		Mamut Copper Mining Sdn. Bhd. (wholly owned subsidiary of Mega First Corp. Bhd.) 1/	Mamut, Sabah	100
Gas:				
Natural	million cubic meters per day	Esso Production Malaysia Inc.	Offshore Terengganu	33
Do.	do.	Sabah Shell Petroleum Co. Ltd.	Offshore Sabah	2.8
Do.	do.	Sarawak Shell Bhd.	Offshore Sarawak	77.7
Liquefied		Malaysia LNG Sdn. Bhd. (60% owned by PETRONAS, 17.5% by Shell Gas N.V., 17.5% by Mitsubishi Corp., and 5% by Sarawak State government)	Tanjung Kidurong, Bintulu, Sarawak	8,100
Do.		Malaysia LNG Dua Sdn. Bhd. (70% owned by PETRONAS, 15% by Shell Gas N.V., 15% by Mitsubishi Corp., and 10% by Sarawak State government)	Do.	7,800
Gold, refined	kilograms	Specific Resources Sdn. Bhd. (joint venture of Pahang State Development Corp. and Avocet Mining PLC of the United Kingdom)	Penjon, Pahang	3,110
Nitrogen, ammonia		Asean Bintulu Fertilizer Sdn. Bhd. (63.5% owned by PETRONAS, 13% by P.T. Pupuk Sriwidjaja Indonesia, 13% by the Thai Ministry of Finance, 9.5% by the Philippines National Development Co., 1% by Singapore Temasek Holdings Pte. Ltd.)	Bintulu, Sarawak	326
Petroleum, crude	million 42-gallon barrels per day	Esso Production Malaysia, Inc.	Offshore Terengganu	390
Do.	do.	Sabah Shell Petroleum Co. Ltd.	Offshore Sabah	100
Do.	do.	Sarawak Shell Bhd.	Offshore Sarawak	184
Do.	do.	PETRONAS Carigali Sdn. Bhd.	Offshore Terengganu	22
Steel, crude		Perwaja Steel Sdn. Bhd. (51% owned by Maju Holdings Sdn. Bhd., 30% by Lion Group, 19% by Terengganu State government)	Kemaman, Terengganu	1,200
Tin:				
Concentrate		Rahman Hydraulic Tin Bhd. (privately owned company)	Klian Intan, Perak	1
Do.		Petaling Tin Bhd. (wholly owned subsidiary of Malaysia Mining Corp.) 2/	Kuala Langat, Selangor	1
Do.		Tima Langat Bhd. (65% owned by Selangor State government and 35% by Malaysia Mining Corp.)	do.	1
Refined		Escoy Smelting Sdn. Bhd. (formerly Datuk Kermate Smelting Bhd. which is 50.5% owned by Amalgamated Metal Corp., 29% by Consolidated Tin Smelter Ltd., and 20% by Malaysia Mining Corp. Bhd.) 3/	George Town, Penang	20
Do.		Malaysia Smelting Corp. Bhd. (37.44% owned by The Straits Trading Co., Ltd., 37.44% by Malaysia Mining Corp., and 25.12% by other)	Butterworth, Penang	40

See footnotes at end of table.

TABLE 2--Continued
MALAYSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 1998

(Thousand metric tons unless otherwise specified)

Commodity	Major operation companies and major equity owners	Location of main facilities	Annual capacity
Titanium, oxide	Tioxide (Malaysia) Sdn. Bhd. (85% owned by Tioxide Group PLC and 15% by Terengganu State Government)	Kemaman, Terengganu	50

1/ The Mamut Mine was scheduled to be closed permanently in June 1999.

2/ Tin mining ceased after Pataling tin was asked by the Kuala Langat Land and District office to surrender its mining leases in 1998.

3/ The Escoy tin smelter was closed permanently in April 1998.