THE MINERAL INDUSTRY OF

CHINA

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In 1999, China's economic growth slipped to its lowest level in the 1990's. The State Statistical Bureau reported that China's gross domestic product grew by 7.1% to $1 trillion and the retail price index fell by 2.9% in 1999, compared with those in 1998 (China Statistical Information and Consultancy Service Center, 1999). The decline in growth was the result of the rising unemployment caused by industry restructuring. People worried about job security and were inclined to save in anticipation that they may also lose their jobs as a consequence of further restructuring. An official of the Ministry of Labor and Social Security predicted that an additional 5 million state workers would lose their jobs in 2000, thus bringing the number of laid-off employees from state-owned enterprises (SOE's) to 11.5 million (China Daily, 2000f, Financial Times, 2000e); these figures do not include about 100 million seasonal unemployed workers in the rural areas. The rising unemployment rate was expected to become more pronounced when Chinese companies tried to gain more efficiencies to compete against foreign companies.

Despite the recent restructuring of the manufacturing sectors, the problems associated with excess output capacity and redundant labor remained for the Chinese Government to solve. Deflation had spurred price wars in many industries, such as fertilizer and steel (Financial Times, 2000b; Zhonghua Renmin Gongheguo Guowuyuan Gongbao, 1999b). The profit margins on goods produced by many SOE's continued to decline. Consumers and industrial companies, who believed that goods would become cheaper in the future, delayed their purchases (Financial Times, 2000b).

In an effort to persuade consumers to spend, the Government implemented a 20% tax on interest on personal bank savings accounts that would become effective on November 1, 1999. The Government had reduced interest rates repeatedly in the past 3 years but had little success in boosting consumption, because consumer confidence in the future had been undermined by the mass restructuring of SOE's and the incomplete reforms of the national social security, medical care, and housing reform systems. As the Government scaled back its 3-year spending program on port, road, and other infrastructure in the second half of 1999, investment in fixed assets by the Government increased by only 7.8% in 1999 compared with that in 1998. In 2000, the Government planned to increase its fixed asset spending by $12 billion (Financial Times, 1999a).

To commercialize banking, the Government issued $32.5 billion in bonds to recapitalize the banks and set aside $5.4 billion to close out defaulted loans in 1998. The Government had tightened its credit supervision. The People's Bank of China (Central Bank) was restructured along the lines of the U.S. Federal Reserve System, with nine affiliates forming a monetary policy committee. To eliminate defaulted loans, the Government has considered several options, such as writing them off at a faster rate, auctioning them off, establishing deposit insurance, and setting up a debt-equity swap program.

The Government maintained the capital controls on its financial sector and restricted transfers of foreign exchange in and out of the country. The Chinese financial sector was largely closed to foreign financial institutions. The country planned to have its renminbi become fully convertible in 10 years. The structural problems in the banking sector were the fundamental obstacles to allow free cross-border portfolio flows. The country had not developed a market-driven interest rate system. For China to have market-determined interest rates, the SOE's must rely less on a policy-driven interest rate system. With about 80% of state bank loans going to SOE's and state sector reform incomplete, asset quality in the banking system was expected to worsen in the short term. Also, fragile domestic confidence in the local banking system might potentially cause massive capital outflow and a banking implosion.

Government Policies and Programs

In 1999, the Chinese Government issued several mineral laws and regulations to supplement existing laws and regulations, including provisions on coal management; temporary management methods on mineral resources exploration, registration, and evaluation; regulations governing registration for the exploitation of mineral resources; provisions on the examination and approval of land use for construction; a system for managing idle land; regulations for the implementation of the land administration law; methods of foreign-funded commercial business for trail implementation; and contract law. The implementation of new laws and regulations will significantly reduce the time for domestic and foreign investors to sign contracts (Zhonghua Renmin Gongheguo Guowuyuan Gongbao, 1999c).

The Government established four asset-management companies, which were similar to Resolution Trust Corp. of the United States, to assume and resolve debts between state-owned banks and SOE's in China. Xinda (Cinda) Asset Management Co. would tackle the unresolvable loans of the China Construction Bank, Hua Rong Asset Management Co. would handle the nonperforming loans for the Industrial and Commercial Bank of China, Great Wall Asset Management Co. would handle nonperforming loans for the Agricultural

Bank of China, and China Dong Fang (Orient) Asset Management Co. would assess the unresolvable debts of the Bank of China. These banks had been assigned by the Government to mining industries. The asset-management companies planned to raise funds and to buy the banks' nonperforming loans in exchange for stakes in debtor ventures and hoped to get their returns from issuing shares in the domestic stock market or selling their stakes to new investors (China Daily, 1999a).

Since the mid-1990's, the Government has placed SOE reform at the top of its agenda. In September 1999, the Central Committee of the Chinese Communist Party endorsed "Decisions on Major Issue Concerning the Reform and Development of State-Owned Enterprises." Although this document represented the extension of existing policies, it demonstrated the Government's commitment to tackle SOE reform during the next decade. The Government allowed enterprises to sell land-use rights as investments in joint ventures or cooperative projects and to use land to secure mortgage loans; the land had been allocated by the state to these enterprises during the planned economy era (China Daily, 2000g).

According to an official of the State Bureau of Taxation, preferential taxes for foreign enterprises would be phased out after China joins the World Trade Organization (WTO) (Financial Times, 2000c). The Government planned to set uniform tax rates for foreign and domestic enterprises. Under the existing law, all corporations in China were taxed at the rate of 33% after various deductions; most foreign companies, however, enjoyed preferential tax agreements with state and local governments. Especially in the industrial development zones, foreign companies enjoyed 2 years free of corporate taxes followed by 3 years of taxation at the rate of 7.5%.

In 1999, the Government decided to close seven nonferrous mines in Liaoning Province and allocated $145 million as compensation to miners. The Government also instructed state banks to write off debts owed by these mining enterprises. According to the State Administration of Nonferrous Metals Industry (SANMI), 56 state-owned nonferrous-metal mines had nearly exhausted resources, and relied on Government subsidies to remain in operation. In October 1999, the Government authorized Yangjiazhangzi Mining Bureau at Jinxi City, Liaoning Province to declare bankruptcy (China Metal Market, 1999c; China Metals, 1999j). Yangjiazhangzi, which was one of oldest nonferrous metals bureaus in China, produced mainly copper, lead, molybdenum, tungsten, and zinc. Initially, miners and unemployed workers demonstrated peacefully, but then the demonstrations turned violent. The displaced workers demanded more Government assistance in providing job opportunities in the area. In northeastern China, regular demonstrations by retired workers unable to draw their pensions and protests at the lack of welfare payment had been reported (China Metals, 2000d; Financial Times, 2000d; Washington Post, 2000).

With the overheated economy gradually coming under control, the Government proceeded cautiously on the structural reforms. In 1998, the State Economic and Trade Commission (SETC) became an industrial ministry in charge of five former industrial ministries, three state holding companies, and two trade associations that were downgraded to bureaus. Many ministries-turned-SETC-bureaus operated with some autonomy because they had the expertise to regulate their respective industries and SETC offices were having trouble regulating powerful state enterprises. In 1999, the SETC accelerated restructure of its mineral enterprises. It regrouped most of the former China National Nonferrous Metals Industry Corp.'s smelters, refineries, fabricating plants, and research institutions along product lines into three holding corporations: China Aluminum Corp. (Chalco), China Copper Lead Zinc Corp. (CCLZ), and China Rare Metals and Rare Earth Group Corp. In 2000, the Government planned to disband these three corporations and transfer part of their smelters, refineries, and plants to local governments. China National Petroleum and Natural Gas (Group) Corp., which was also known as China National Petroleum (Group) Corp. (CNPC), and China Petrochemical (Group) Corp. (Sinopec), which were under the State Administration of Petrochemical Industry; Shenhua (Group) Corp., which was under the State Administration of Coal Industry; China National Star Petroleum Corp. (CNSPC), which was under the Ministry of Land and Resources; and China National Offshore Oil Corp. (CNOOC) were put under the supervision of the State Council (China Nonferrous Metals Industry, 1999c; Zhonghua Renmin Gongheguo Guowuyuan Gongbao, 1999a).

The SETC published 201 categories that the Government would not support and grant loans from banks or financial institutions for any banned projects. These banned projects had surplus production capacities and/or used obsolete technologies that caused environmental pollution and serious waste of natural resources. In the metal sector, banned new construction projects included blast furnaces, converters, electric arc furnaces (EAF's), coke furnaces with carbonization chambers smaller than 4 square meters (m^2), hot-rolled tube mills with tube diameters of less than 76 millimeters (mm), sinter machines that were smaller than 90 m^2, hot-rolled silicon steel plants, aluminum smelters that used Soderberg cells or had an output capacity less than 100,000 metric tons per year (t/yr), copper smelters and refineries, lead and zinc smelters, magnesium smelters, nickel-cadmium or zinc-magnesium battery plants, gold mining with ore-processing capacity of less than 25 metric tons per day (t/d), and site leaching with ore-processing capacity of less than 5,000 t/yr (Economic Daily, 1999b).

Production

In 1999, according to the SANMI, China produced a total 6.56 million metric tons (Mt) of nonferrous metals; this was an increase of 10.9% compared with that of 1998 (China Metal Market, 2000b, China Nonferrous Metals Monthly, 2000c). The preliminary figures indicated that production increased in 7 out of 10 base metals; the exceptions were copper, mercury, and titanium sponge. In 1998, the SANMI reported that the country produced 70,464 metric tons (t) of magnesium, but China Magnesium Association reported that the total magnesium output was 120,000 t (China Nonferrous Metals

Industry, 1999b). Statistical data reported from China remained confusing because of the large size of the country and the many small producers for which no accounting could be made.

Although Chinese aluminum production had been growing rapidly, domestic demand for aluminum exceeded production, and China became a net aluminum importer in 1999. The net imports of unwrought aluminum and alloys were 327,404 t (China Nonferrous Metals Monthly, 2000a). Reasons for the increase of imports were not only an increase in demand, but also the Government's clampdown on smuggling activities after which regional traders and consumers had increased their imports to stockpile material as a hedge against price increases (China Metals, 1999n). In 1999, the fluctuation of aluminum prices in China was generally in line with that of alumina prices. Although the Government increased the export rebate rate on aluminum to 15%, domestic aluminum prices were higher than those of the international market; Chinese aluminum producers were, therefore, reluctant to export their products. The demand had been significantly boosted by work on large infrastructure projects, which included the construction and upgrade of powerplants in the country. The construction sector was China's largest aluminum consumer, followed by packaging, durable goods, and machinery.

The decline of copper output in the first 6 months of 1999 had pushed the domestic copper prices to a 3-year high in the second half of the year. Some copper producers in China faced a shortage of raw materials that led to a decline in copper output. To alleviate the situation, China imported 1.25 Mt of copper concentrates, 129,960 t of blister copper, 404,764 t of refined copper, and 1.70 Mt of copper scrap (China Nonferrous Metals Monthly, 2000b). China had blister copper output capacity of about 1 million metric tons per year (Mt/yr), but the country produced about 500,000 t/yr of copper concentrates. China imports more than 1 Mt/yr of copper concentrates to meet its demand. Owing to lack of large copper mines in the country, the dependency on imported concentrates to feed its smelters was expected to continue in the future. To ensure a stable output of refined copper, the country imported a large quantity of copper scrap. Many secondary copper producers located in the coastal area depended on imported copper scrap for their operations. Most of the dismantling and recovery of copper scrap was handled manually in an unprotected environment. As a result of burning off plastic and rubber, the soil and rivers were polluted. Because of environmental regulations, however, secondary recovery of copper had declined in the past several years.

China's economy was expected to grow by about 7% in 2000, and the copper consumption was estimated to be in the range of 1.4 to 1.5 Mt. With the copper production target at 1.2 Mt, China would be likely to import about 200,000 t to meet the gap; much of the imported copper, however, would be in tolling trade (China Nonferrous Metals Industry, 2000a). Owing to quality problems in many of its domestic products, the imports of semimanufacturing products increased by more than 15% in 1999, compared with that of 1998 (General Administration of Customs of the People's Republic of China, 1999). The copper export duty was to be eliminated in 2000. China's copper producers export of more refined copper in 2000 would affect the domestic copper market prices. Chinese fabricating plants might import more semimanufactured copper products to meet the demand.

After 5 years of decline, steel prices in the domestic market showed a sign of stabilizing in the second half of 1999. Of the 20 steel products monitored by the State Administration of Metallurgical Industry (SAMI), 10 posted price increases in the last 2 months of the year. Owing to Government efforts to counteract smuggling, prices of cold-rolled sheet and stainless steel rose by more than 10% in 1999. In general, steel prices fell by an average of $19 per metric ton in 1999. Prices of wire rod, rebar, hot-rolled medium plate, seamless tube, and welded pipe declined by more than $25 per metric ton (China Metallurgical News, 1999c).

In 1999, the Government urged Chinese steelmakers to reduce their output of crude steel and steel products by 10% compared with 1998's totals and to limit steel imports to 7 Mt. By yearend, the production of pig iron increased by 6.1%; crude steel, 8.4%; ferroalloy, 9.7%; and rolled steel, 13.4%. Steel imports increased by 19.7%, which was twice the official target. The SAMI planned to continue its efforts to control steel output and to set the outputs of crude steel at 110 Mt and rolled steel at 100 Mt in 2000. In 1999, China consumed about 118 Mt of steel, and the Government predicted that steel consumption would be about 120 Mt in 2000. To achieve this goal, the SAMI established seven enforcement teams and assigned them to 43 major steel producers to ensure that the Government's guidelines would be followed. Blast furnaces with capacities equal to or less than 50 cubic meters (m^3), converters and EAF's with capacities less than 10 t, and steel producers with output capacities of 100,000 t/yr would be closed. The Government would not issue any operation licenses to those steel plants that were targeted for closure. Financial institutions were forbidden to provide any loans to those steel producers, and their products were not allowed to be sold in the market (China Daily, 2000e; China Metallurgical News, 1999b; Zhonghua Renmin Gongheguo Guowuyuan Gongbao, 2000).

The world steel market showed a state of gradual recovery in the last several months of 1999. The demand of hot- and cold-rolled thin steel plates increased in the Republic of Korea and Taiwan. The import steel prices from non-Commonwealth of Independent States countries increased sharply in southern China in the last quarter of 1999, helping to stabilize steel prices in the domestic market (China Metallurgical News, 2000d). If the quantity of steel output and steel imports were under control, the drop in the prices of steel products in the domestic market in 2000 could be restrained.

The country had tin mining and dressing capacity of about 520,000 t/yr and smelting capacity of 120,000 t/yr. China's export of about half its tin output per year impacts greatly on the world tin market. Most of the tin and its products were exported to Japan, North America, and other developed countries. For the past 2 years, tin prices in the international market have increased gradually, as has the tin output in China. In 1999, the output of refined tin and exports of tin and its alloys increased by 17% and 20%, respectively,

compared with those of 1998 (China Nonferrous Metals Monthly, 2000c; General Administration of Customs of the People's Republic of China, 1999). China consumed about 25,000 t/yr, about 40% of which was used in the production of soldering tin; 32%, in alloys; 15%, in tinplate; and the remaining, in other sectors.

Trade

In November 1999, after 13 years of negotiations, the United States signed a bilateral accord with China to support China's admission into the WTO (Washington Post, 1999). The negotiation of bilateral agreements between China and other countries continued. It could take China at least another year to join the WTO. China was an extremely important market for the world minerals industry, being one of largest mineral exporters, importers, and producers in the world. After acceptance into the WTO, China's import tariffs were expected to drop substantially. Perhaps more importantly, China will have to lift restrictions on who will be allowed to import into the country. At present, only those companies or agencies that have obtained import licenses can do so. The liberalization of imports will allow foreign companies to integrate their distribution networks fully and to deliver their services directly to their customers in China (Asian Chemical News, 1999; Barry, 2000).

Domestic producers feared that direct competition with foreign companies that operated in China could present a bigger threat than lower tariffs because multinational companies usually have large capital resources, advanced technologies, strong product advantages, and favorable tax policies offered to them by their Governments. Domestic producers thought that even large- and medium-sized domestic enterprises would suffer from the competition against international companies. Also, under the WTO, China would have to abolish export subsidies and tax exemptions for domestic enterprises. World market prices on certain commodities such as antimony, coal, iron and steel, magnesium, and tungsten might change dramatically (Asian Wall Street Journal, 1999). The Government was expected to revamp laws on foreign trade, joint ventures, and foreign investment to eliminate the requirements that foreign companies export a certain percentage of their products, maintain foreign exchange reserves, and operate in specific geographic areas. The Government, however, planned to retain its control of oil imports and to continue preferential access of domestic banks to Government credit even after foreign banks enter the market (Asian Wall Street Journal, 2000).

Ministry of Foreign Trade and Economic Corp. (MOFTEC) decided to transfer its import and export license authorities to the Quota and License Affairs Bureau. MOFTEC would focus on formulating policies for importing and exporting and coordinating with other government agencies and would use computer networks to distribute and inspect import and export quota licenses, to transmit trade statistics, and to supervise export tax rebate. Hopefully, this should improve trade administration efficiency and reduce illegal actions, such as using fake quota licenses to gain export opportunities and cheating to receive tax rebates (Asian Chemical News, 1999).

According to customs statistics, total trade reached $360.6 billion in 1999; this was an increase of 11.3% compared with that in 1998. Exports recovered from the Asian financial crisis and posted an increase of 6.1% to $194.9 billion; imports went up by 18.2% to $165.7 billion. Asian countries, which were China's largest export market, accounted for 60% of its total exports in 1996. Owing to the Asian financial crisis, exports to the region dropped by about 10%; exports to North America and Europe went up by less than 10%. In 1999, exports of machinery and electronic products grew by more than 10%, and labor-intensive products, such as garments, shoes, and toys, were unchanged. Such imports as alumina, copper, crude oil and refined oil products, steel, and petrochemicals increased by more than 10%. The total trade of base metals was $9.3 billion, which was an increase of 20.3% compared with that of 1998. Japan remained China's largest partner, with a total trade of $66.2 billion, followed by the United States, $61.5 billion; the European Union, $55.7 billion; Hong Kong, $43.8 billion; the Association of Southeast Asia Nations, $27.1 billion; the Republic of Korea, $25 billion; and Taiwan, $23.5 billion (General Administration of Customs of the People's Republic of China, 1999). China's imports of refined lead, nickel, tin, and zinc were mostly in the form of processing trade.

Because the domestic chemical market was flooded with imported chemical fertilizers in 1999, the Government announced that it would strictly control the import of chemical fertilizer into China in 2000. The total amount of chemical fertilizer imports must be submitted to the State Council for approval. Import quotas would be issued jointly by the SETC and MOFTEC. China National Chemicals Imports and Exports Corp. and China Agricultural Means Corp. were assigned to import chemical fertilizer by the Government. The import of potassic fertilizer, diammonium phosphate, and compound fertilizer, which were within the state plan, would be exempted from the import value-added tax (VAT) (China Chemical Reporter, 2000c).

The Government adjusted the preferential import and export tariffs on many commodities for 2000. Most adjustments were for textiles, but some metal products were also affected. The export duties for lead concentrate changed from 30% to 5%; zinc concentrate, 30% to 10%; tin concentrate, 50% to 20%; ferrosilicon, 25% to 10%; and unwrought aluminum, aluminum scrap, aluminum products, unwrought antimony, copper anode, unwrought copper, copper scrap, copper products, unwrought nickel, and unwrought zinc, from various percentages to 0%. The import duties for aluminum, lead, steel, titanium, and zinc products were reduced to less than 10% each. In addition, the Government decided to provide special tariffs on imports of 800,000 t of alumina at 8%, 17,000 t of aluminum sheet for producing aluminum foil at 4%, 30,000 t of hot-rolled steel coil for cold-rolling processing at 2%, and 60,000 t of cold-rolled silicon sheet for producing power generators at 4%. The Government assigned an alumina import quota of 500,000 t to the SANMI; 250,000 t to Minmetals; and 50,000 t to the State Bureau of Construction Materials. The hot-rolled steel coil quota was designated to the SAMI, and the cold-rolled silicon sheet quota was divided

between the SAMI and the State Bureau of Machinery Industry (China Metals, 2000f).

The China Security Regulatory Commission issued a total of 10 hedging licenses for which Chalco, CCLZ, China Nonferrous Metals Trade Group, and Minmetals received the permits that allowed them to hedge on commodities in the international futures markets. Small- and medium-sized nonferrous metals producers could hedge their products through any one of these companies (Metal Bulletin, 1999a).

Commodity Review

Metals

Aluminum.—The Government planned to overhaul the aluminum sector in China. More than 110 aluminum smelters had a combined total output capacity that exceeded 2.8 Mt/yr. About 100 smelters used 60-kiloampere (kA) or less Soderberg cells for their aluminum production. In 1999, the SETC issued guidelines to close all smelters that were using less than 60-kA Soderberg cells or to change their operations to prebaked cells. The closure would result in reducing output capacity by 85,000 t/yr. The Government estimated that the renovation program would cost about $1.6 billion; after renovation, however, the aluminum output capacity was expected to increase by 3.5 Mt/yr. The SETC approved bank loans to five smelters—Fushun Aluminum Plant, Guanlu Aluminum Plant, Lanzhou Aluminum Plant, Liancheng Aluminum Plant, and Yunnan Aluminum Plant—for their renovation projects (China Metals, 2000a).

Chalco decided to centralize the purchasing, importing, and distributing of alumina in China. Six state-owned alumina producers under Chalco—Guizhou Aluminum Plant, Pingguo Aluminum Industry Co., Shandong Aluminum Plant, Shanxi Aluminum Plant, Zhengzhou Aluminum Plant, and Zhongzhou Aluminum Plant—signed supply contracts with 70 aluminum smelters for 2000. Non-Chalco smelters, which accounted for more than 50% of the total output, had problems with this policy because Chalco's offered prices on alumina were higher than those on the international market, and Chalco charged higher administration fees for alumina imports than other traders (China Metals, 2000g; China Nonferrous Metals News, 1999b).

Guizhou Aluminum Plant signed a contract with Pechiney of France to develop a high-pressure-density alumina refinery process that would increase its alumina output capacity to 600,000 t/yr. The company also planned to expand its alumina production capacity to 720,000 t/yr by 2005, mainly by renovating its digesting system (China Metals, 1999d).

The Zhongzhou Aluminum Plant of Changcheng (Great Wall) Aluminum Corp. planned to increase its alumina production capacity by 400,000 t/yr by using the intensified sintering process to produce 300,000 t/yr of alumina. The expansion plan would be carried out in two phases. In the first phase, 100,000- t/yr output capacity would be added to its existing refinery; construction was scheduled to begin in 2000. In the second phase, the company planned to build a 300,000-t/yr ore-dressing Bayer-process refinery. In the ore-dressing Bayer process, silicon oxide would be removed from bauxite ore in the dressing plant. The washed ore, which would have an Al:Si ratio of more than 10:1, would then be fed into the Bayer-process system to produce alumina. Preliminary results indicated that, compared with the sintering process, the ore-dressing Bayer process system reduced the production costs. The State Development and Planning Commission (SDPC) approved in principle a budget of $182 million for the project, of which $24 million would be funded by state capital (China Nonferrous Metals News, 1999d).

The Fushun Aluminum Plant which was the oldest aluminum smelter in China, planned to invest $48.2 million to replace its 60-kA Soderberg cells with 200-kA prebaked cells. It would increase the smelter output capacity to 150,000 t/yr from 115,000 t/yr. The Government would provide $38.7 million through bank loans and require the company to raise the balance (China Metals, 1999f).

In August 1999, with Government approval, Zhejiang Aluminium Co. Ltd. at Lanxi, Zhejiang Province, declared bankruptcy. The company had operated a 168 60-kA Soderberg cells smelter, which had an output capacity of 25,000 t/yr of aluminum, and a 17,000-t/yr aluminum fabricating plant. In the first 7 months, the smelter produced 14,952 t of aluminum. Because of high power costs, the company suffered financial losses in the past several years. The Government wrote off the debts and auctioned the company's assets. China Energy Zhejiang Investment Co. bid $16.4 million to take over the company (China Metals, 1999b).

The construction of the Zhongning Aluminum Smelter in Zhongning County, Ningxia Huizu Autonomous Region, was completed in July 1999. The $25 million smelter, which was owned by Qinyi Industrial Group Co., had an aluminum output capacity of 12,500 t/yr. The company planned to expand its output capacity to 100,000 t/yr by 2010 (China Nonferrous Metals News, 1999c).

Pingguo Aluminum Industry Co. announced that the installation and trial runs of its 30 320-kA prebaked cells were completed in November 1999. The company's aluminum output capacity increased by 27,000 t/yr (China Nonferrous Metals News, 1999f). On November 18, Pingguo and Cinda signed a debt-equity agreement to transfer loans from the State Development Bank and the Construction Bank of China to equity of Cinda (China Nonferrous Metals News, 1999e). On December 12, Qinghai Aluminum Co. and China Dong Fang (Orient) Asset Management Co. signed a debt-equity agreement to convert $130 million loans provided by the Bank of China to equity of Dong Fang. The Government hoped that these agreements would intensify the efforts of the enterprises to improve management (China Metals, 2000a).

The expansion construction of the Guanlu Smelter of Shanxi Guanlu Holding Co. Ltd. began in 1999. The expansion project was scheduled to be completed in August 2000 and would increase the company's aluminum output capacity to 103,000 t/yr in 2000 from 33,000 t/yr in 1999. The company planned to increase its aluminum production capacity to 250,000 t/yr by 2005 (China Metal Market, 1999b).

Copper.—Effective on January 1, 2000, the export duty on

copper was scheduled to be reduced to 0% from 30%. In 1999, the Government allowed copper producers to export 60,000 t of copper free of duty. In China, most copper exports were in the form of tolling trade on which the VAT was exempted. CCLZ issued regulations and guidelines on importation of copper concentrates and exportation of nickel, silver, and zinc. Subsidiaries of the company were not allowed to sign trade contracts with foreign companies or to use other domestic trading companies to import and export their raw materials and products. By mid-September of the next calendar year, copper smelters were required to submit their copper concentrate import and metals export plans to CCLZ, which would sign the contracts with the foreign suppliers. The smelters, however, were responsible for obtaining letters of credit. CCLZ also required its nickel and zinc producers to export 40% of their output and to export 40% of their silver output if their output capacities were more than 20 t. Producers were required to pay CCLZ a 0.6% commission upon payment for copper concentrates imports, 0.6% of their earnings from nickel and zinc exports, and 1% of their earnings from silver exports. For futures trades, only commodity section heads of the CCLZ trade department were allowed to sell or buy their respective commodities. Hedging plans, however, had to receive initial concurrence by the managers of the smelters (China Metals, 1999m). CCLZ's regulations created problems for many domestic smelters and foreign traders when import and export contracts signed by domestic smelters were not being honored (China Metals, 2000g).

The decline of copper output in the first 6 months of 1999 had pushed the domestic copper prices to a 3-year high in the second half of the year. Facing a shortage of funds and raw materials, some copper producers reduced their copper output in the first half of the year. China had a blister copper output capacity of about 1 Mt/yr. Because the country produced only about 500,000 t/yr of copper concentrates, more than 1 Mt/yr of copper concentrates had to be imported to meet the demand. With few large copper mines in the country, the dependency on imported concentrates was expected to continue. In 1999, China imported 1.25 Mt of copper concentrates, 129,960 t of blister copper, and 404,764 t of refined copper (China Metals, 1999e; China Metal Market, 2000b; China Nonferrous Metals Monthly, 2000c). To make up for the shortage in domestic resources, the country also imported 1.70 Mt of copper scrap in 1999. Many secondary copper producers were located in the coastal areas and depended on imported copper scrap for their operations.

Yunnan Copper Co. signed a contract with M.I.M. Holdings Ltd. of Australia to renovate its copper smelter. According to the contract, M.I.M. would replace the two EAF's with an Ausmelt furnace. Besides the replacement of the furnace, the converter system would be upgraded to reduce energy consumption and emission of pollutants. After completion, the blister copper output capacity would be increased to 125,000 t/yr from 120,000 t/yr. Yunnan's copper refining output capacity was 150,000 t/yr. The renovation project was expected to be completed in early 2001. The company also added a copper wire and rod line in its fabricating plant (China Metals, 1999k).

The Xitieshan Mining Administration and the Qinghai Provincial government planned to invest a total of $266 million jointly to develop the Saishitang deposit in Xinghai County, Zang Autonomous Region in Qinghai Province. The deposit had a proven reserve of 1 Mt copper, grading 1.13%. The partners also planned to build a 500,000-t/yr mining and dressing facility at the mine site (China Metal Market, 1999a).

Qiemo Copper Co. Ltd., which was a joint venture between a Xinjiang local company and a European company, invested $187 million to develop the open pit Katelixi Copper Mine, which is 155 kilometers (km) west of Qiemo County, Xinjiang Uygur Autonomous Region. The mine covered an area of 1.5 square kilometers (km^2) and contained 1.2 Mt of copper and zinc with average copper grading 2.23%. After completion, it will have an ore mining and dressing capacity of 100,000 t/yr. The company planned to build a 12,000-t/yr copper plant at the nearby site (Zhongguo Guotu Ziyuanbao, 2000b).

Gold.—According to a senior official from the Gold Bureau of the SETC, the Chinese Government was planning to deregulate the gold market in 2 years and to establish a gold exchange market. With the continuous structural reform in the country, the gold sector, especially gold prospecting, suffered from shortage of funds. In 1999, the Government allocated only $12 million to the gold sector and planned to eliminate special funds for prospecting for gold in 2000. Foreign investment in the gold sector was under guidelines issued by the SDPC, the SETC, and MOFTEC; solely foreign funded gold mining was, however, still banned. The SDPC and the SETC were jointly preparing guidelines to remove barriers on foreign investment and to allow foreign funds to be used in grassroots gold prospecting. In 1993, the Government allowed foreign investors to participate in gold mines with either low-grade ores or that required advanced smelting technology. All gold output was required to be sold to the Central Bank per the 1983 gold and silver control regulations (China Metallurgical News, 2000b).

The Government's tight control of the gold sector resulted in price differences between domestic and world markets. Prices of gold ornaments in China were about $2 per gram higher than those in neighboring countries. In 1999, the Central Bank adjusted domestic gold prices five times to bring them closer to world gold prices (China Gold Economy, 2000).

General Minerals Corp. (GMC) received the approval from the Chinese Government for its joint venture with its Chinese partners to explore and develop the Towerbeck gold prospect near the border with Kazakhstan in Xinjiang Uygur Autonomous Region. Under the terms of joint venture, GMC could earn 71% equity in Towerbeck by spending $2.9 million in prospecting and could increase its interest in the project to 85% (Mining Journal, 1999b).

With the approval of central and provincial governments, the Shandong Zhaoyuan Gold Smelter, the Zhaoyuan City Sulfuric Acid Plant, and Yantai Brewing Co. Ltd. formed Shandong Guoda Gold Smelting Co. Ltd. The new company had the capacities to produce 1,500 t of copper, 9.4 t of gold, and 150,000 t of sulfuric acid (China Gold, 1999c). Also, three gold mining companies—Jintong, Jinqing, and

Jintai—in Hubei Province, which were subsidiaries of China Gold Corp., jointly established Hubei Sanjin Gold and Copper Co. Ltd. The total output capacities of the new company were 5,200 t of copper and 800 kilograms of gold (China Gold, 1999b). The expansion of Zhaoyuan Gold Co. Ltd.'s dressing plant, which was completed in 1999, increased the company's dressing capacity to 5,000 t/d from 2,600 t/d (China Gold, 1999d).

The Zhongyuan Gold Refinery and Polideng Engineering Co. Ltd. of Sweden signed a technical cooperation agreement in China. Polideng assisted Zhongyuan in setting up a gold-refining plant in Henan Province that would expand gold output capacity to 30 t/yr; it was scheduled to be completed by yearend 2000 and cost an estimated $3 million (China Gold, 2000c).

Iron and Steel.—In 1999, the growth of steel consumption remained weak. In the second half of the year, the Government injected $12 billion into infrastructure construction funds, and the 1998 postflooding rebuilding in the Chang Jiang (Yangtze River) areas required about 2 Mt of steel products; stockpiles in 39 major steel producers' warehouses, however, declined by only 3.4% at yearend, compared with those at the beginning of the year. In August 1999, the SAMI ordered producers of medium-thickness, 6- to 40-mm, steel plate to maintain their output at the assigned targets; 25 medium-thickness steel plate producers were state-owned companies. Imports of medium-thickness steel plate accounted for only 2% of the total output. The Government established a task force that included representatives from medium-thickness steel plate producers to monitor and coordinate outputs and imports. At yearend, the total production was 13.8 Mt of medium-thickness steel plate, which was an increase of 8.1% compared with that of 1998, and met the Government's reduced production target (China Metallurgical News, 2000e).

In 1999, the Government established the China Iron and Steel Industry Association to replace the China Metallurgical Industry Management Association. The functions of the Association included assisting the Government in providing guidelines for the development of the iron and steel sector; collecting, analyzing, and publishing domestic and international iron and steel information; participating in updating technical, economical, and management standards and guidelines; and issuing quality-assurance permits (China Nonferrous Metals Industry, 1999a).

In 1999, 2,506 iron and steel companies were operating; of these 290 had steelmaking capacity with a combined total output capacity of 134 Mt. The Government intended to close 103 small steel producers with a total output of 3.58 Mt of crude steel, 2.9 Mt of rolled steel, and 1.42 Mt of pig iron in 1999. The closure of the small plants and the replacement of furnaces in some large plants would result in losses of 4.5 Mt of steelmaking output capacity. Because of technological upgrades underway at other steel plants, however, 3.5 Mt of steelmaking output capacity would be added to the total, and by yearend 2000, the country would have a total crude steel output capacity of 133 Mt (China Metallurgical News, 2000f). According to the Government's technical development plan, blast furnaces with an output capacity of less than 100 m^3, plants that produced less than 300,000 t/yr of carbon steel, and wire rod mills with an output capacity of less than 250,000 t/yr would be shut down by 2002. By that time, only about 65 steelmaking enterprises would be operating in China (China Metallurgy, 1999; China Metallurgical News, 2000c).

In recent years, the production of galvanized sheet has grown quite rapidly. In 1994, China had four continuous galvanized sheet lines, with a total combined output capacity of 765,000 t/yr. In 1998, the number of galvanized sheet lines increased to 13; they had a combined output capacity of 1.75 Mt/yr. China had 12 continuous galvanized strip lines with a total output capacity of 100,000 t/yr; they also produced 1.2 Mt/yr of galvanized sections, 1.15 Mt/yr of galvanized cables, pipes, tubes, and wires. Each year, the steel sector consumed about 320,000 t of zinc. Anshan Iron and Steel (Group) Co. (Angang) and Changjiang Sheet Co. planned to add two galvanized sheet lines with a total combined output capacity of 550,000 t/yr. By 2005, China's galvanized steel sector could consume about 500,000 t of zinc (China Metals, 1999l).

The Government planned to realign its iron and steel producers as it did for Baogang Group in 1998. In 1999, the Government approved the merger or takeover of several iron and steel companies—Benxi Iron and Steel Co. and Beitai Iron and Steel Co., Chengdu Seamless Tube Plant into Panzhihua Steel Co. (Pangang), Hainan Pengda Plate Co. into Wuhan Iron and Steel (Group) Co. (Wugang), Chongqing Special Steel Plant into Chongqing Iron and Steel Co., Huludao Steel Pipe Plant into Lingyuan Steel Co., and Pingxiang Steel Co. into Jiangxi Trust and Investment Co. The SAMI was considering establishing one or two large iron and steel enterprises in each province or region. Shoudu (Capital) Iron and Steel (Group) Co. in Beijing, Tangshan Iron and Steel Co., the Xuanhua Steel Plant, and Handan Iron and Steel General Works in Hebei Province, and iron and steel companies in Tianjin Municipality might become a conglomerate. In Sichuan Province, Pangang, the Great Wall Special Steel Plant, and the Chengdu Steel Plant would become a group. In Hunan Province, a group under the name of Anyang Steel Group with Anyang Iron and Steel Plant as the core would be established to take over the management of the metallurgical enterprises in the Province. In Xinjiang Uygur Autonomous Region, Xinjiang Baye Iron and Steel Co. would take control of the steel enterprises in the region. In Liaoning Province, the Government was considering merging Angang and Benxi. The Government also planned to consolidate special steel enterprises into regional special steel groups and to establish a China Carbon Group Corp. with the Jilin Carbon Plant and the Lanzhou Carbon Plant as pillars to take over the small- and medium-sized carbon enterprises. Metallurgical research and engineering institutions would be placed under China Metallurgical Construction Group Corp. (China Metals, 2000c).

China continued to have an inadequate supply of iron ore to meet the demand for its iron and steel sector. It was second to Japan in terms of import volume of iron ore. Domestic iron ore could supply only about 60% of the country's needs. About 70 iron and steel companies required imported iron ore for their production. Owing to high production costs and low

returns on investment, steel enterprises had difficulty obtaining funding for new construction and expanding current mine output capacity. China's steel enterprises had invested through joint ventures in foreign iron ore mines—Channar and Koolyanobbing in Australia and Hierroperu in Peru. The country continued looking for more joint-venture possibilities in iron mines in Australia and India. With the domestic supply deficit expected to rise, China's imports of iron ore were expected to increase in volume during the coming decade.

The Government implemented a debt-to-equity swap program to help steel enterprises to reduce their debts. In 1999 and 2000, 37 steel enterprises were expected to be targeted for the $7.6 billion debt-to-equity swap program. Seven steel enterprises—Angang, Baogang, Hengyang, Lanzhou, Shougang, Taiyuan, and Zunyi—signed agreements with asset-management corporations. The Government believed that the swap program would allow enterprises to improve their financial conditions and would be conducive to their long-term development (China Metallurgical News, 1999a; China Metals, 2000e).

Hangzhou Iron and Steel Works completed renovation of its electric steel plant in 1999. The company imported an 80-t EAF from French Clecim to replace its three small furnaces in the plant. The $72 million renovation also included a high-drawing-speed continuous casting line from Austrian VAI. The steel output capacity increased to 420,000 t/yr from 150,000 t/yr with a full continuous casting capability. The company planned to invest $60 million to build a 350,000-t/yr high-speed wire-rod line in the next several years (China Metals, 1999g).

Hualing Steel Tube and Wire Co. Ltd., which was a subsidiary of Hunan Hualing Group Co., received approval from the Government to issue 200 million shares at the Shenzhen Stock Exchange on July 5. The company had output capacities of 2.7 Mt/yr of steel and 1.88 Mt/yr of rolled products, which included 200,000 t of seamless tubes and 1.2 Mt of sections. The company planned to use the stock fund to acquire Hengyang Tube Co., Huaguang Wire Co., Loudi Steel Works, and Changsha Copper and Aluminium Co. in Hunan Province and to pay for the technical renovation of its casters (China Metals, 1999i).

The SDPC approved Baogang's investment of $302 million to build two galvanizing lines with a combined capacity of 600,000 t/yr. One would be a 350,000-t/yr hot-dipping line and the other, a 250,000 t/yr electrolytic line. Both lines would be placed in the cold-rolling plant and were scheduled to be completed in June 2000 (China Metals, 1999i). The SETC approved Baogang's establishment of Baoshan Iron and Steel Co. Ltd. for iron and steel marketing and technical improvement (China Metallurgical News, 2000a).

Shanghai Krupp Stainless Co. Ltd., which was a 60-40 joint venture between Krupp Thyssen Stainless of Germany and Baogang's subsidiary Pudong Iron and Steel Co., signed a $176.9 million loan agreement with International Financial Corp. and Kredit für Wiederauffau, a German bank, for its first-phase cold-rolled stainless steel project which will produce 72,000 t/yr by 2001. The $295 million first-phase construction started in 1999 and was expected to be completed in 2001. The $78.1 million loan from the German bank would be used to import equipment and technology from Germany (China Economic News, 1999b).

In 1998, Japan, the Republic of Korea, and Taiwan exported a total of 1.12 Mt of stainless steel to China and Hong Kong, of which 557,300 t was allocated to China, Hong Kong consumed about 160,000 t of stainless steel per year, and the remaining, about 400,000 t, was exported mainly to China, which might not be recorded in the customs figures. Owing to the crackdown on smuggling in 1999, imports of stainless steel increased by 74% compared with that of 1998. In 1999, the output of stainless steel was about 400,000 t, and the SAMI estimated stainless steel consumption was 1 Mt; domestic analysts estimated consumption at about 1.5 Mt. Imports were required to satisfy about 80% of the demand. The Government approved two stainless steel projects at Baogang and Taiyuan in its ninth 5-year plan (1995-2000) and decided to subsidize interest payment for 3 years for these projects. Baogang planned to invest $900 million in Shanghai No. 1 Steel Works, which was its subsidiary, to convert it into a stainless steel producer. The plan was to retain 2,500 m^3 and 700 m^3 blast furnaces, which had a combined output capacity of 2 Mt of pig iron, but to add a 120-t converter, a 120-t VOD furnace, and a 600,000-t/yr continuous slab caster. The 1,200-mm semicontinuous rolling mill would be replaced by a 1,700-mm continuous rolling mill. After renovation, Shanghai No. 1 would have output capacities of 400,000 t/yr of hot-rolled stainless steel coil and 100,000 t/yr of slab. Coils from the plant would be shipped to Baoxin and Zhangjiagang POSCO for the manufacture of downstream products. Taiyuan planned to replace the EAF in its No. 3 steel plant with a bigger furnace, which would increase stainless steel output capacity to 250,000 t/yr. After renovation, Taiyuan would have stainless steel output capacity of 500,000 t/yr (China Metals, 2000h; Metal Bulletin, 1999b).

Angang expected to continue its renovation plan during the next 5 years. The company planned to phase out its small less-than-1,000-m^3 blast furnaces and replace them with more environmentally friendly ones. A 100% continuous casting mill would be installed in its No. 1 plant, and a second cold-rolled line would be added to its No. 2 plant. New Steel Co. of Anshan Steel, which was its subsidiary, received approval from the Government to issue $181 million in convertible corporate bonds on the domestic stock market (China Metals, 2000b).

Lead and Zinc.—The first phase of construction of Guangxi Liuzhou Huaxi Group Corp.'s (China Tin Group Co.) Laibin Huaxi Indium and Zinc Smelter in Laibin was completed in July 1999. The $40 million indium-zinc project was designed to produce 41 t/yr of indium and 25,000 t/yr of zinc. Raw materials were supplied from the Liuzhou Nonferrous Metals Smelter (formerly the Dachang Mining Bureau). About 62% of indium was recovered from zinc slag (China Metals, 1999c; Zhongguo Guotu Ziyuanbao, 1999e). The second phase of construction began in late 1999 and was scheduled to be completed in the first half of 2000. When completed, the smelter would have a total output capacity of 82 t/yr of indium. The company also invested $4.5 million to build an indium-

processing plant that could produce 10 t/yr of indium-tin oxide, which would be used in liquid crystal displays. The company intended to expand its zinc output capacity to 60,000 t/yr. The smelter also recovered 160 t/yr of cadmium from its zinc smelting process (China Metals, 1999o).

With SETC approval, Yuguang Gold and Lead Group Co. planned to expand its refined lead output capacity by 50,000 t/yr to 100,000 t/yr by yearend 2000. The expansion project included upgrading one of the existing sintering systems by introducing a rich-oxygen bottom-blowing smelting process to increase crude lead output to 50,000 t/yr from 15,000 t/yr. The company also had the capacity to produce 15,000 t/yr of lead oxide and 7,000 t/yr of zinc oxide. The company intended to recover 4,000 t/yr of copper and 20,000 t/yr of zinc from the lead waste slags (China Gold, 2000b, China Metal Market, 2000c).

On December 9, 1999, Billiton China BV, which was a subsidiary of Billiton plc of the United Kingdom, and Yunnan Lanping Nonferrous Metals Co. (YLNM), which was a subsidiary of Yunnan Metallurgical Corp., signed an agreement for exploring the Lanping lead and zinc deposit, located near the Lancang Jiang (Lancang River) in Nujiang Autonomous Perfecture, Yunnan Province. Billiton had 9 months to complete the preliminary feasibility study. If both parties decided to continue after the preliminary study, the final feasibility study would be completed by the end of 2001. Depending on the results of the evaluation, a joint-venture company would be formed in which Billiton would hold 65% of the interests and a 200,000-t/yr zinc plant would be constructed. Reportedly, the deposit contained about 14.3 Mt of lead and zinc grading above 9% of lead and zinc. Although the area remained officially unexplored, it had long been mined by local miners until the Yunnan government cleared out unauthorized mining operations. Four local state-owned small enterprises were joined to form YLNM, which had a 700 t/d mining capacity, a 1,300 t/d ore dressing capacity, a 3,000- t/yr zinc oxide plant, and a 5,000-t/yr zinc refinery plant (China Metal Market, 2000a; China Metals, 1999a; Mining Journal, 1999a; Zhongguo Guotu Ziyuanbao, 1999b).

Hubei Jinyang Metallurgical Holding Co. Ltd., Jiangsu Chunxing Alloy (Group) Co. Ltd., and Shanghai Feilun Nonferrous Metals Co. established a secondary lead producers association. In 1996, China had about 500 secondary lead producers that produced about 170,000 t of secondary lead. Owing to environmental problems and the Government's enforcement of environmental protection regulations, the number of secondary lead producers had been reduced to 300. In 1998, the output of secondary refined lead decreased to about 92,000 t. The association's goals were to coordinate the secondary lead production; to provide technical information to its members, especially on reducing production costs; and to recommend policy guidelines to the Government (China Nonferrous Metal Industry, 2000b; China Nonferrous Metals News, 1999g).

Silver.—After a 5-month trial program, the Government decided to adjust its 1983 gold and silver control regulations and allowed silver to be traded on the Huatong Market Exchange in Shanghai on January 1, 2000. The Government abolished the Central Bank's silver purchasing and distribution monopoly and allowed silver producers to sell directly to users. The Government also abolished the licensing system for processing and wholesale and retail selling of silver products except for silver coins. VAT would be charged to all silver transactions, and state funds would not be allocated for silver prospecting in the future. In the past, the Chinese Government classified statistical information about precious metals as state secrets, and the country's production and consumption data were not readily available. Silver production outpaced demand in the past several years, and surplus silver was purchased by the Central Bank. The Government also decided that the Central Bank would not sell any of its surplus silver on the domestic market (China Gold, 1999a; Zhongguo Guotu Ziyuanbao, 1999d). The disposal of silver on the domestic market would depress prices and hurt producers, but selling it on the international market would acquire more foreign exchange. The Government issued a circular curbing silver imports in general trade (China Gold, 2000a).

Silver consumption data in China are not reliable. On the basis of annual sale records, an official from the Central Bank estimated that the demand for silver was about 1,000 t in 1998. Many domestic analysts, however, believed that the quantity was lower. The machinery and electronics sector was the major consumer of silver (35%), followed by photo materials and chemicals (20% each), jewelry (10%), and other (15%). With the abolishment of the quota system, the demand for silver could expand in the next several years, and silver consumption could increase to about 1,600 t by 2005 (China Nonferrous Metals News, 2000).

The development of the Xiacun silver and base metal deposit in Baiyu, Sichuan Province, which was a joint venture between Breckenridge Resources Ltd. of Canada and Xinyuan Mining Co. Ltd., was approved by the SDPC. The prefeasibility study indicated that the deposit would support the development of a 1,500-t/d mine and mill for a minimum life of 15 years, and the cost, which included the cost of the final feasibility study and off-property road improvements, was estimated at $96 million. Under the terms of agreement, Breckenridge would have a 70% interest in the joint venture and would be required to contribute $24 million of the $34 million registered capital (Asian Journal of Mining, 1999b).

Tin.—In October 1999, the Yunnan Tin Co. Ltd. received approval by the China Securities Regulatory Commission to issue 130 million shares at 6.00 yuan a share in the Shenzhen Stock Exchange. Yunnan Tin was a joint venture established by Gejiu Juyuan Industry Co., Gejiu Tin Capital Nonferrous Metals Fabrication Works, Gejiu Tin Material Industrial Co., Gejiu Yunguan Art Works, and Yunnan Tin Co. in November 1998. In November 1999, the expansion construction of the company's 150-t/d Datun dressing plant was completed (China Nonferrous Metals News, 1999a).

Industrial Minerals

Cement.—China ranked first in the world in cement output from its 9,200 cement plants, which had a total output capacity of 700 Mt. In 1999, the Government was stepping up its efforts to close down as many as 4,100 small cement plants, many of them operating without licenses, and trying to reduce cement production by 100 Mt by the end of 2000. At yearend, cement output increased by 6.9% to 573 Mt (China Statistical Information and Consultancy Service Center, 1999; Zhongguo Guotu Ziyuanbao, 1999c). About 80% of cement output was being produced by shaft kiln, and 20%, by rotary kilns. To protect the environment and to meet the requirements for higher grade cements for construction needs in urban areas, the Government planned to shut down many manually operated shaft kilns and convert many shaft kilns to rotary kilns during the next few years. Production capacity of rotary kilns was expected to increase to 135 Mt in 2000 by upgrading existing plants and building new ones. The Government also placed emphasized on developing a range of modern precalcining kilns and converting wet kilns to semidry kilns.

With Government approval, China Building Materials and Equipment Import and Export Corp., China New Building Materials Corp., and Hefei Cement Research and Designing Institute, which were the State Administration of Building Material Industry's subsidiaries, jointly established the China United Cement Co. Ltd. (Zhonglian Cement). Zhonglian Cement was assigned to manage about 60 state-owned cement plants, which had a total output capacity about 20 Mt/yr (China Economic News, 1999a).

Du Jiang Yan Construction Material General Corp. and Lafarge China Offshore Holding Co. Ltd. agreed to build the Du Jiang Yan Cement Plant at Jin Feng village, Du Jiang Yan Economic Development Zone, Sichuan Province. The joint venture applied to the International Finance Corporation for a $35 million loan to support the project. The plant was designed to produce 1.08 Mt/yr of clinker and 1.3 Mt/yr of cement by using a rotary kiln and a precalcinator. The Government intended for the new plant to replace five existing plants—Chengdu, Dong Feng, Du Jiang Yan, Min Jiang, and Pu Yang—in the Du Jiang Yan area (Asian Ceramics and Glass, 2000).

Fertilizer.—China is a major fertilizer producer and consumer in the world. In 1999, the total output of fertilizer, which reached 29.4 Mt, included 24.1 Mt of nitrogenous, 5.0 Mt of phosphate, and 324,761 t of potassic fertilizers. The country, however, consumed about 39 Mt/yr of fertilizer. The gap was filled by imports. The output of nitrogenous fertilizer was in excess of demand, and the outputs of phosphate and potassic fertilizers could not meet demand. In 1999, China imported 13.35 Mt of chemical fertilizers, which was a decrease of 4.1% from that of 1998, owing to the restriction on urea imports that was imposed by the Government at the end of 1998 (China Chemical Reporter, 2000d). In the domestic market, the supply of chemical fertilizer was abundant, and the demand was low. In 1999, the average price of fertilizer dropped by more than 5% compared with that of 1998.

China is one of the countries rich in phosphorus resources and produced more that 20 Mt of phosphorus rock, which contains more than 7 Mt of P_2O_5, from the Provinces of Guizhou, Hubei, Hunan, Sichuan, and Yunnan. Owing to transportation problems, a large quantity of phosphorus rock from mines in Guizhou and Yunnan could not be delivered to fertilizer plants on the eastern coast. To use the abundance of domestic phosphorus resources and to reduce transportation problems, the Government began constructing several integrated phosphate fertilizer complexes, which included Wengfu in Guizhou and Jinning in Yunnan, near the mines. The Government also planned to build phosphate fertilizer plants in the Provinces of Anhui, Hebei, Shandong, Shanxi, and Sichuan. By 2005, phosphate fertilizer output capacity could be about 8.5 Mt/yr; the Government, however, projected that the phosphate fertilizer demand would exceed 10.5 Mt at that time.

Sulfuric acid is an essential raw material for manufacturing phosphate fertilizer. In 1999, China produced 22.5 Mt of sulfuric acid. Of that, about 72% was produced from pyrite; 22%, from the recovery of sulfur dioxide in the metallurgical sector; 5%, from native sulfur; and 1%, from gypsum. More than 70% of the total sulfuric acid output was consumed by the phosphate fertilizer sector (China Chemical News, 2000b).

Jiangsu Wuxi Zhengyu Chemical Industrial Co. Ltd.completed construction of a 20,000-t/yr potassium sulfate unit early in 1999, and the second 20,000-t/yr unit was being built in the later part of 1999. The Mannheim process was used in these units to produce high-grade potassium sulfate. Liaoning Panjin Yongxing Chemical Industrial Corp. commissioned a 10,000-t/yr potassium sulfate plant in 1999 (China Chemical Reporter, 1999b).

Sodium Compounds.—China was the second largest soda ash producer in the world behind the United States. Domestic supply was higher than demand. The Government set the output target of 7 Mt of soda ash in 1999. In the first half of 1999, however, the output of soda ash increased by 4.5%, compared with the same period in 1998. Inventory in producers' warehouses increased to 1 Mt. In spring 1999, the average selling price on the southwestern and eastern coasts decreased by $12 per ton. On August 3, the SETC issued a circular to order soda ash producers to control their output according to their submitted production plan. At yearend, China produced more than 7.6 Mt of soda ash, and the average selling price including taxes was $109 per ton. In 1999, the country consumed about 6.5 Mt of soda ash and exported 1.04 Mt of soda ash, which was an increase of 340,000 t compared with that of 1998 (China Chemical News, 2000a). From 1975 to the nineties, China was one of the largest soda ash importers. Since then, China had become the world's largest synthetic soda producer and a self-sufficient producer. Also, China's growing soda ash exports intensified the competition in the Asian markets.

Four Indian soda ash producers filed a complaint with their Government against Chinese soda ash producers and traders that exported to India between April 1, 1998, and June 30, 1999. A sharp decline in soda ash prices in the Indian market

caused financial difficulties for Indian soda ash producers. Preliminary results indicated that domestic soda ash producers were affected by a large quantity of soda ash imports from China. The Indian Government imposed a minimum price of $150 per ton cost including freight on soda ash imports from China (Asian Chemical News, 1999).

In 1999, China's soda ash sector continued its expansion. The Lianyungang Soda Plant of Sinopec Nanjing Chemical Industrial Corp. commissioned a 200,000-t/yr low-salt soda ash unit that was designed by Dalian Research & Design Institute of Chemical Industry; the centrifugation and separation components were imported. Fuzhou Yaolong Chemical Industrial Group Corp. invested $7.5 million to expand its soda ash output capacity to 100,000 t/yr from 60,000 t/yr. Sichuan Zigong Honghe Chemical Industrial Co. Ltd. completed the installation of a 150,000-t/yr soda ash unit for which major equipment was imported from Japan (China Chemical Reporter 1999b, 2000e).

The output capacity of the caustic soda sector in China expanded rapidly in the last decade. Output exceeded demand. Many caustic soda producers switched their caustic soda processing technology to ion-membrane cell from mercury or diaphragm cell. In 1999, several ion-membrane-cell-based caustic soda plants were commissioned in Kaifeng, Nanning, Sanlian, Tianjin, Qilu, Qingdao, Wuhu, and Xi'an. The light industry sector consumed about 40% of the caustic soda total output; followed by the chemical sector, 30%; and the textile and other sectors, 15% each (China Chemical News, 1999).

Mineral Fuels

In the past, the restricted supply of electricity hindered the country's economic development. Because of the slowdown of economic growth, China's electric power industry experienced an oversupply problem in 1999. The Government intended to upgrade existing power grids and to eliminate small and inefficient thermal plants during the next 3 years. Most of the small powerplants were diesel or coal-fired plants that were operated by provincial and local governments as demand grew in the 1980's. The Government was attempting to build and upgrade the power grid and to strengthen the economic growth in the rural areas. Consumers in the rural areas paid much higher electricity prices than those in the urban areas. The Government had provided $16.5 billion for grid unification projects in 1,500 counties. State Power Corp., which was the monopoly owner of China's power grid, started buying limited amounts of electricity through an open bid process known as "power pooling" (the lowest cost power is purchased first). The Government hoped that the change would lower the price of electricity and accelerate development in the rural areas where economic growth had suffered partly because of high price for electricity and unstable supply (China Daily, 1999d).

Owing to the weak demand for electricity, the Government decided to suspend the construction of new nuclear powerplants for 3 years. China had two operating nuclear powerplants—one in Qinshan just south of Shanghai and the other at Daya Bay, Guangdong Province. The total installed capacity was 2,100 megawatts (MW). Four others with a total installed capacity of 6,000 MW were under contruction: the second and third phases at Qinshan, Ling'ao in Guangdong Province, and Lianyungang in Jiangsu Province. Another nuclear powerplant at Haiyang on Shandong Peninsula was waiting for final approval from the Government. In December 1999, the letter of intent on financing the construction of Haiyang nuclear plant was signed between State Power Corp. (40%), Shandong Power Corp. (25%), China National Nuclear Corp. (20%), Shandong Provincial Trust & Investment Corp. (10%) and Yantai Power Development Co. Ltd. (5%) (China Daily, 1999b). The SDPC wanted to increase the share of nuclear power as a percentage of total power output in China to 5% by 2020.

Coal.—China, which was the world's largest coal producer, continued its coal sector reform in 1999. The Government closed down more than 31,000 coal mines and coal production decreased to 1.05 billion metric tons (Gt), which was a reduction of about 200 Mt compared with that of 1998 (Zhongguo Meitan Bao, 2000c). Small coal mines that were not near large state-owned mines were expected to be completely shut down in 2000. At yearend, the national coal stockpile totaled 174 Mt, which was a decline of 26 Mt from January 1999. The coal demand in such sectors as cement, fertilizer, and metallurgy remained weak; coal exports, however, increased by more than 15%. During the past 22 months, the demand for coal in the domestic market declined by more than 180 Mt because many coal-consuming enterprises adopted energy saving programs and decreased energy consumption. The oversupply affected the coal market. During the first 10 months of the year, coal prices decreased by an average of $1.75 per ton, which caused coal producers to lose more than $350 million in revenue. Coal producers also faced a severe problem of nonpayment by state-owned enterprises to which they must continue to supply under existing contracts. By yearend 1999, state-owned enterprises owed state-owned coal producers more than $4 billion. The nonpayment affected the cash flow of many coal producers, thus forcing them to continue borrowing for capital needs to pay worker salaries and benefits or else not pay their workers. A backlog of more than $600 million worth of salary payments was owed to thousands of coal miners (Zhongguo Meitan Bao, 2000a).

China exported about 6% of its total coal output. The Government's efforts to reduce stockpiles included encouraging exports of coal. The Government provided such incentives as exempting port construction fees for a 2-year period, raising its export rebate on coal from 9% to 17%, reducing port handling charges, and exempting coal exporters from the commodity inspection fee. During the past couple of years, the number of ports handling coal exports had increased. Besides existing ports (Lianyungang, Qianvvan, Qinhuangdao, Rizhao, and Tianjin), several new ports (Bayuquan, Fangcheng, Jing Tang, and Lanshan) were ready for operation in 1999. Furthermore, loading conditions in the existing ports had improved. The transportation capacity of China's railway system remained the bottleneck for expanding coal exports. The major railway artery from Datong to

Qinhuangdao fell behind Qinhuangdao's designed coal handling capacity of 100 Mt (Asian Journal of Mining, 1999a).

In 1999, the Government merged related associations into two coal groups—China National Coal Imports and Exports (Group) Corp. (CNCIEC) and China Coal Construction (Group) Corp. (CCCC). CNCIEC and CCCC, which were separated from the State Administration of Coal Industry, were placed under the supervision of the State Council. Management team members for these two companies were appointed by the Ministry of Personnel. Under CNCIEC, 33 subsidiary enterprises had total output capacities of 23 Mt of coal, 10 Mt of washed coal, and 200 million cubic meters of coal gas. CCCC included China United Coalbed Methane Co. Ltd., which was known as Zhonglian Coal Gas Co. Ltd., and Huajin Coke Co. (Economic Daily, 1999a; Zhongguo Meitan Bao, 1999a, b).

The Government reformed its supervisory system to ensure coal mine safety in China. Prior to December 30, 1999, local coal industry administrations in each region had their own safety regulatory system. On December 30, the State Council authorized the SETC to establish the State Coal Mining Safety Bureau to oversee the country's coal mine safety. The coal mine safety supervision departments in each of the provincial and autonomous regions coal bureaus were transferred to the SETC. Branch offices will be set up in the large- and medium-sized coal mines. Coal mines that violated coal mine safety guidelines would be closed and their operating licenses would be revoked. In 1999, accidents in local coal mines claimed 2,075 lives, which accounted for 61.8% of total coal mine deaths (Zhongguo Meitan Bao, 2000a, b).

The Shaanxi Provincial government planned to develop the Yushen coal mine. The mine is located at the southern end of the Shenfu coal mining area in Yulin Prefecture. It covered an area of 5,500 km^2 and had proven reserves of 30.1 Gt in 13 minable coal seams. Sulfur content was in the range of 0.28% to 0.66%. In initial stage, the mine was designed to produce 54.5 Mt/yr of coal and increase to 100 Mt/yr. The Shen-Yan (Shenmu to Yan'an) railway was under construction to link to other major railways (China Coal News, 2000).

Oil and Gas.—The Chinese Government continued to reform the structure of its oil and gas sector in 1999. The aim was to improve the efficiency and competitiveness of the state oil enterprises and to privatize them partially by offering shares in the domestic and international stock markets. Three shareholding companies existed at the national level: China Petroleum Co. Ltd. (China Petroleum or PetroChina) under CNPC, China Petroleum & Chemical Corp. (Sinopec Corp.) under Sinopec, and China Offshore Oil Co. Ltd. under CNOOC. These companies regrouped their respective key subsidiaries for stock listings in the domestic and international markets (China Chemical Reporter, 2000a; Zhonguo Shiyou Bao, 1999). The State Council also decided to merge CNSPC into Sinopec, thus making it a wholly owned subsidiary of Sinopec, and renamed it as Sinopec Star Petroleum Co. Ltd. (China Daily, 2000b). The restructuring of these oil enterprises was to separate profitable and nonprofitable functions within the enterprises in anticipation that the profitable subsidiaries would attract foreign investors. In 1999, the National People's Congress approved a new fuel tax on gasoline and diesel that would impact the price of and demand for transportation fuels in China.

China had become more dependent on imported oil to fill the gap between supply and demand. In 1999, China imported nearly 40 Mt of crude oil and oil products, which accounted for about 20% of the country's total consumption. The demand for crude oil was expected to increase at an annual rate of 4% for the next decade, thus widening the gap between supply and demand. For downstream products, China had a refining capacity of 200 Mt/yr; the utility rate, however, was only 66%, which led the Government to ban imported refined oil products in 1999. The Government intended to maintain the existing crude oil processing capacity and to renovate existing refineries to process imported crude oils (China Daily, 2000c).

With the growing future dependence on oil imports, China had acquired interests in exploration and production in other countries. CNPC held concessions in Iraq, Kazakhstan, Sudan, and Venezuela. Greater Nile Petroleum Operating Co., which was a CNPC joint venture in Sudan, began exporting crude oil to China in August 1999. China and Russia agreed to cooperate in exploiting oilfields in Irkutsk and the Sakhalin Island in Siberia. Russia planned to export 1 to 1.5 Mt of crude oil to China in 2001 through a 2,400-km pipeline to Beijing from Anjarsk, which is 40 km northwest of Irkutsk (China Chemical Reporter, 2000c; China Daily, 2000d).

China Xinxing Oil Co. announced the discovery of oil at Lunqian in the North Xizang Plateau. The company estimated that there was about 150 Mt of oil in the Lunpola Basin (China Chemical Reporter, 1999c). CNSPC found a 720-km^2 oilfield to the north of Tarim River; the geologic reserve was estimated to about 1 Gt. The Changqing Oil Prospecting Bureau reported that a 300-Mt oilfield was found in the Shaanxi-Gansu-Ningxia region (China Chemical Reporter, 1999a).

China's offshore oil output accounted for about 10% of the country's total. CNOOC planned to increase its oil output to 40 Mt in 2005. In 1999, CNOOC and its foreign partners discovered five oil- and gas-bearing structures in Bohai and the Pearl River. In 2000, CNOOC intended to drill 162 production wells to compensate for the expected production decline from existing fields. Three new fields were scheduled to begin production in 2000 in Bohai: Qikou 17-2, Suizhong 36-1, and Qinhuangdao 32-6 (Oil & Gas Journal, 2000).

CNOOC and Phillips China Inc., which was a subsidiary of U.S.-based Phillips Petroleum Co., announced the discovery of an oilfield in block 11/05 that is approximately 216 km from Tanggu and 128 km from Dalian in Bohai where the water was 23 meters deep. On the basis of the results of the three drilled wells, the Penglai 19-3 in block 11/05 was estimated to contain 400 million barrels of potentially recoverable oil reserves. Phillips acquired the right to explore block 11/05 from the Chinese in 1994. Under the contract, CNOOC had the right to acquire up to 51% interest in any development in the block. Phillips also discovered three other wells in this block and planned to initiate commercialization studies jointly with CNOOC (China Daily, 1999c; Zhongguo Guotu Ziyuanbao, 2000a). In 1999, CNOOC also discovered four other oilfields: Bozhong 25-1, Bozhong 29-4, and Caofeidian

11-1 in Bohai and Panyu 5-1 in the Pearl River.

China and Vietnam agreed to resolve the issue on the demarcation of the Beibu Gulf by the end of 2000. CNOOC had planned to explore for oil and gas in the gulf. Geologists believe that Beibu Gulf contains an abundance of oil and gas resources. The Spratly Islands also were thought to hold oil and gas resources; the area, however, was claimed by several neighboring countries (China Daily, 1999e).

China's natural gas resources have been discovered in the southwest, west, and offshore—Bohai, Qinghai, Shaanxi-Gansu-Ningxi, Sichuan, the South China Sea, and Xinjiang. Most of these reserves were essentially undeveloped. About 58% of the proven reserves are in remote areas, such as loess plateau, hilly land, and deserts. China's regionally segmented pipeline system only connects gasfields to nearby consumers.

The Government approved PetroChina's request to build a 4,200-km natural gas pipeline from the Lunnan gasfield in Tarim Basin, Xinjiang Uygur Autonomous Region, to Shanghai; the estimated cost was $7.23 billion. Natural gas reserves in Xinjiang Uygur Autonomous Region were estimated to exceed 420 billion cubic meters. Such foreign investors as British Petroleum Co. Ltd. and U.S.-based Enron Corp. showed interest in the pipeline project. The pipeline construction was scheduled to begin in 2001 and to be completed in 2007 (China Daily, 2000h). Enron International (China) Pipeline Co., which was a subsidiary of Enron, signed a letter of intent with CNPC to build a pipeline jointly to transport natural gas from Sichuan Province to Wuhan City, Hubei Province. The 500-km pipeline would cost about $240 million and would transport 3 billion cubic meters per year of natural gas. Enron committed to invest 45% of the project capital. CNPC also considered an extension of the pipeline northward into Henan Province (Journal of Commerce, 1999). Royal Dutch/Shell Corp. had a joint $3 billion project with PetroChina to develop natural gas fields at Ordos Basin in Shaanxi and Nei Mongol and to transport it to eastern China (Financial Times, 2000a). The 4,160-km oil pipeline from Karamay, Xinjiang Uygur Autonomous Region, to Kazakhstan was under construction. The pipeline was expected to transport 25 Mt/yr of oil from Kazakhstan to China. The 480-km section from Korla to Shanshan with Xinjiang had been completed. Construction of the link from Shanshan to Luoyang in Henan Province and Pengzhou in Sichuan Province was underway (Journal of Commerce, 1999).

To satisfy a growing demand for energy and to reduce pollution, the Chinese Government approved the $500 million liquefied natural gas (LNG) terminal project in Chentoujiao, Shenzhen City, Guangdong Province. CNOOC, which was Guangdong's Power Industry Bureau, and the Shenzhen City government were authorized to set up a holding company to take charge of this project. BP/Amoco Corp., Enron, Mobil/Exxon Corp., and Royal Dutch/Shell Corp were preparing to bid for a 35% share of this project, which might yield as much as $10 billion in LNG import contracts for the next 20 years. The terminal was scheduled to be completed in 2005. Two LNG powerplants were scheduled to be built in Huizhou and Shenzhen to replace five powerplants in Shenzhen and Foshan. The LNG project was designed to provide 2 Mt/yr of fuel for cities in the Pearl River Delta area (China Daily, 2000a).

Reserves

In June 1999, the Government decided to change its mineral reserves administration system. The old reserves system, which had been adopted from the former Soviet Union, stressed the geologic existence of reserves. Reported Chinese mineral reserves were those that were geologically proven but may not be economical for production. The new reserve system would be based upon the United Nations international classification of reserves/resources that had been proposed by the European Union Commission in 1997. Mineral resources would be classified into three categories: reserves, reserve base, and resources, which is further divided into 16 subcategories (Zhongguo Guotu Ziyuanbao, 1999a).

China has a diverse range of mineral resources and is self-sufficient in most minerals. The country imported alumina, chromite, cobalt, copper, iron ore, manganese, petroleum, platinum-group metals, and potash. Reserves of antimony, barite, coal, graphite, fluorite, magnesite, molybdenum, rare earths, tin, and tungsten rank among those of the top five countries in the world.

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TABLE 1
CHINA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1995	1996	1997	1998	1999
METALS						
Aluminum:						
Bauxite, gross weight	thousand tons	5,000	6,200	8,000	8,200	8,500
Alumina, gross weight	do.	2,200	2,550	2,940	3,330	3,840
Metal, refined, primary and secondary	do.	1,870	1,900	2,180	2,440	2,620
Antimony:						
Mine, Sb content		125,000	129,000	131,100	97,400 r/	100,000
Metal		130,000	128,000	120,100	82,000	83,500
Bismuth:						
Mine output, Bi content		740	610	550	240 r/	400
Metal		800	750	760	820 r/	1,300
Cadmium, smelter		1,450	1,570	1,980	2,130 r/	2,200
Cobalt:						
Mine output, Co content		980	190	200	40 r/	100
Metal		240	230	470	410 r/	400
Copper:						
Mine output, Cu content		445,000	439,000	495,500	486,800 r/	500,000
Metal:						
Smelter, primary		538,000	615,600	789,000	839,000 r/	830,000
Refined, primary and secondary		1,080,000	1,120,000	1,180,000	1,211,000	1,210,000
Gold, mine output, Au content		140	145	175	178	170
Iron and steel:						
Iron ore, gross weight	thousand tons	249,350	249,550	268,000	246,900 r/	209,000
Pig iron	do.	105,300 3/	107,200 3/	115,110 3/	118,600 3/	125,390 3/
Ferroalloys	do.	4,320 3/	4,180 3/	4,040 3/	3,558 r/ 3/	3,810
Steel, crude	do.	95,360 3/	101,240 3/	108,940 3/	115,590 r/ 3/	124,260 3/
Steel, rolled	do.	89,800 3/	93,380 3/	99,780 3/	105,100 3/	120,570 3/
Lead:						
Mine output, Pb content		520,000	643,000	712,000	580,500 r/	501,000
Metal:						
Smelter, primary		360,000	363,000	466,500	566,800 r/	486,000
Refined, primary and secondary		608,000	706,000	707,500	757,000 r/	859,000
Magnesium metal, primary		93,600	73,100	75,990	70,500	120,000
Manganese ore, gross weight	thousand tons	6,900	7,600	6,000	5,300 r/	5,500
Mercury, mine output, Hg content		780	510	830	230 r/	200
Molybdenum, mine output, Mo content		33,000	29,600	33,300	30,000	27,900
Nickel:						
Mine output, Ni content		41,800	43,800	46,600	48,700	50,100
Matte		42,600	46,400	39,900	47,000 r/	47,000
Smelter		38,900	44,600	43,300	40,100 r/	44,800
Silver, mine output, Ag content		910	1,140	1,300	1,300 r/	1,320
Tin:						
Mine output, Sn content		61,900	69,600	67,500	70,100 r/	61,700
Metal, smelter		67,700	71,500	67,700	79,300	92,300
Titanium, sponge		1,720	2,130	2,340	2,250	1,660
Tungsten, mine output, W content		27,400	26,500	24,960	24,700	24,000
Vanadium (in vanadiferrous slag product)		13,700	14,000	15,000	15,500	16,000
Zinc:						
Mine output, Zn content		1,011,000	1,120,000	1,210,000	1,273,200 r/	1,367,800
Refined, primary and secondary		1,077,000	1,184,000	1,434,000	1,486,000 r/	1,695,000
INDUSTRIAL MINERALS						
Asbestos		263,000	293,000	288,000	314,000 r/	300,000
Barite	thousand tons	1,800	2,500	3,500	3,300 r/	2,800
Boron, mine, B_2O_3 equivalent		294,600	157,000	135,600	137,200 r/	110,000
Bromine		32,700	41,400	50,100	40,000	42,000
Cement, hydraulic	thousand tons	475,910 3/	491,190 3/	511,730 3/	536,000 r/ 3/	573,000 3/
Diatomite		300,000	320,000	330,000	335,000	340,000
Dolomite	thousand tons	8,090	5,520	6,500	6,700	6,600
Fluorspar	do.	2,000	2,000	2,300 r/	2,350 r/	2,400
Graphite		204,000	185,000	310,000	270,000	280,000
Gypsum	thousand tons	7,340	7,780	9,100	9,000	9,000
Kyanite and related materials		2,500	2,500	3,000	3,050	3,000
Lithium minerals, all types		16,000	16,500	17,000	16,000 r/	15,500
Magnesite	thousand tons	2,050	2,100	2,400	2,400	2,450

See footnotes at end of table.

TABLE 1--Continued
CHINA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1995	1996	1997	1998	1999
INDUSTRIAL MINERALS--Continued						
Nitrogen, N content of ammonia	thousand tons	22,600	23,000	25,300	25,500	26,000
Phosphate rock and apatite, P_2O_5 equivalent	do.	7,960	6,350	7,530	7,500	7,530
Potash, marketable, K_2O equivalent	do.	80	110	115	120	120
Rare earths, rare-earth oxide equivalent		48,000	55,000	53,000	60,000	70,000
Salt	thousand tons	29,780 3/	29,035 3/	30,830 3/	22,420 3/	28,124 3/
Sodium compounds, soda ash, natural and synthetic	do.	5,977 3/	6,693 3/	7,258 3/	7,440 r/ 3/	7,654 3/
Sulfur:						
Native	do.	160	170	200	210	250
Content of pyrite	do.	5,930	5,990	6,040	4,490	3,860
Byproduct, all sources	do.	940	1,100	1,400	1,450	1,580
Total	do.	7,030	7,260	7,640	6,150	5,690
Talc and related materials	do.	2,400	4,000 r/	4,100 r/	3,800 r/	3,900
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Anthracite	do.	260,000	286,000	242,000	250,000	230,000
Bituminous and lignite	do.	1,101,000	1,088,000	1,114,000	985,000	820,000
Total	do.	1,361,000	1,374,000	1,356,000	1,235,000	1,050,000
Coke, all types	do.	135,010 3/	136,400 3/	137,310 3/	128,060 3/	121,100 3/
Gas, natural:						
Gross	billion cubic meters	18	20	23	23	25
Marketed	do.	16	17	18	18	20
Petroleum:						
Crude (including crude from oil shale)	llion 42-gallon barrels	1,100	1,170	1,180	1,200	1,190
Refinery products	do.	950	980	980	950	920

r/ Revised.

1/ Table includes data available through July 25, 2000.

2/ The country also produces diamond, gallium, germanium, indium, platinum-group metals, and uranium; no reliable basis, however, is available for estimation of output levels.

3/ Reported by China's State Statistical Bureau.

TABLE 2
CHINA: STRUCTURE OF THE MINERAL INDUSTRY IN 1999

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies 1/	Location of main facilities	Annual capacity e/
Aluminum:				
Alumina		Pingguo Aluminum Industry Co.	Guangxi, Pingguo	380
Do.		Guizhou Aluminum Plant	Guizhou, Guiyang	450
Do.		Changcheng (Great Wall) Aluminum Corp.	Henan, Zhongzhou	350
Do.		do.	Hunan, Zhengzhou	800
Do.		Shandong Aluminum Plant	Shandong, Zibo	650
Do.		Shanxi Aluminum Plant	Shaanxi, Hejin	1,200
Metal		Baiyin Aluminum Plant	Gansu, Baiyin	50
Do.		Lanzhou Aluminum Plant	Gansu, Lanzhou	82
Do.		Liancheng Aluminum Plant	do.	85
Do.		Pingguo Aluminum Industry Co.	Guangxi, Pingguo	125
Do.		Guizhou Aluminum Plant	Guizhou, Guiyang	240
Do.		Jiaozuo Wanfang Aluminum Co. Ltd.	Henan, Jiaozuo	53
Do.		Luoyang Xin'an Aluminum Smelter	Henan, Luoyang	55
Do.		Sanmenxia Tianyuan Aluminum Co. Ltd.	Henan, Sanmenxia	33
Do.		Hanjiang Danjiangkou Aluminum Co. Ltd.	Hubei, Danjiangkou	53
Do.		Changcheng (Great Wall) Aluminum Corp.	Hunan, Zhengzhou	50
Do.		Yanji Aluminum Plant	Jilin, Yanji	15
Do.		Fushun Aluminum Plant	Liaoning, Fushun	100
Do.		Baotou Aluminum Plant	Nei Mongol, Baotou	120
Do.		Qingtongxia Aluminum Plant	Ningxia, Qingtongxia	200
Do.		Qinghai Aluminum Smelter	Qinghai, Xining	200
Do.		Shandong Aluminum Plant	Shandong, Zibo	60
Do.		Tongchuan Xingguang Aluminum Co. Ltd.	Shaanxi, Tongchuan	55
Do.		Taiyuan Aluminum Plant	Shaanxi, Taiyuan	30
Do.		Yunnan Aluminum Plant	Yunnan, Kunming	120
Asbestos		China National Nonmetallic Industry Corp.	Nei Mongol, Baotou; Shaanxi, Lai Yuan, and Lu Liang	130
Barite		do.	Guizhou, Xiangshou	NA
Coal		State Administration of Coal Industry	Hebei	70,000
Do.		do.	Heilongjiang	100,000
Do.		do.	Henan	100,000
Do.		do.	Liaoning	70,000
Do.		do.	Nei Mongol	90,000
Do.		do.	Shandong	60,000
Do.		do.	Shaanxi	400,000
Do.		do.	Sichuan	80,000
Cobalt	tons	Jinchuan Nonferrous Metals Corp.	Gansu, Jinchang	400
Copper, refined		Jinchang Smelter (Tongling Nonferrous Metals Co.)	Anhui, Tongling	80
Do.		Jinlong Smelter (Tongling Nonferrous Metals Co.)	do.	100
Do.		Wuhu Smelter (Hengxin Copper Industry Group Co.)	Anhui, Wuhu	60
Do.		Baiyin Nonferrous Metals Co.	Gansu, Baiyin	50
Do.		Jinchuan Nonferrous Metals Corp.	Gansu, Jinchuan	20
Do.		Luoyang Copper Processing Factory	Henan, Luoyang	50
Do.		Daye Nonferrous Metals Co.	Hubei, Daye	130
Do.		Guixi Smelter (Jiangxi Copper Metals Co.)	Jiangxi, Guixi	200
Do.		Huludao Copper Smelter (Huludao Zinc Smelting Co.)	Liaoning, Huludao	100
Do.		Shenyang Smelter	Liaoning, Shenyang	100
Do.		Shanghai Smelter (Jiangxi Copper Metals Co.)	Shanghai	80
Do.		Taiyuan Copper Industry Co.	Shaanxi, Taiyuan	30
Do.		Zhongtiaoshan Nonferrous Metals Co.	Shaanxi, Yuangu	80
Do.		Tianjin Copper Electrolysis Factory	Tianjin	25
Do.		Yunnan Smelter	Yunnan, Kunming	100
Gas, natural	billion cubic meters	China National Petroleum Corp.	Sichuan	10
Gold, refined	thousand kilograms	China National Gold Corp.	Henan, Lingbao	10
Do.		Laizhou Gold Co.	Shandong, Laizhou	15
Do.		Zhaoyuan Gold Co. Ltd.	Shandong, Zhaoyuan	15
Graphite		China National Nonmetallic Industry Corp.	Shandong, Laixi, and Pingdu	190

See footnotes at end of table.

TABLE 2--Continued
CHINA: STRUCTURE OF THE MINERAL INDUSTRY IN 1999

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies 1/	Location of main facilities	Annual capacity e/
Iron and steel:			
Iron ore	Maanshan Iron and Steel Co.	Anhui, Maanshan	10,000
Do.	Shoudu (Capital) Iron and Steel (Group) Co.	Beijing	20,000
Do.	Meishan Metallurgical Co.	Shanghai	2,000
Do.	Jiuquan Iron and Steel Co.	Gansu, Jiayuguan	4,000
Do.	Hainan Iron Mine	Hainan, Changjiang	4,600
Do.	Handan Xingtai Metallurgical Bureau	Hebei, Handan	3,800
Do.	Tangshan Iron and Steel Co.	Hebei, Tangshan	3,000
Do.	Wuhan Iron and Steel (Group) Co.	Hebei, Wuhan	5,100
Do.	Banshigou Iron Mine Mining Co.	Jilin, Hunjiang	1,400
Do.	Anshan Iron and Steel (Group) Co.	Liaoning, Anshan	30,000
Do.	Benxi Iron and Steel Co.	Liaoning, Benxi	13,700
Do.	Baotou Iron and Steel and Rare Earth Co.	Nei Mongol, Baotou	10,000
Do.	Taiyuan Iron and Steel Co.	Shaanxi, Taiyuan	4,000
Do.	Dabaoshan Mining Co.	Guangdong, Qujiang	1,670
Do.	Panzhihua Mining Co.	Sichuan, Panzhihua	13,000
Do.	Kunming Iron and Steel Co.	Yunnan, Kunming	1,400
Ferroalloys	Shoudu (Capital) Iron and Steel (Group) Co.	Beijing	35
Do.	Northwest Ferroalloy Co.	Gansu, Yongdeng	60
Do.	Zunyi Ferroalloy Co.	Guizhou, Zunhi	100
Do.	Jilin Ferroalloy Co.	Jilin, Jilin	250
Do.	Jinzhou Ferroalloy Co.	Liaoning, Jinzhou	90
Do.	Liaoyang Ferroalloy Co.	Liaoning, Liaoyang	70
Do.	Shanghai Iron and Steel Co. Ltd.	Shanghai	180
Do.	Emei Ferroalloy Co.	Sichuan, Emei	70
Do.	Hengshan Ferroalloy Co.	Zhejiang, Jiande	70
Crude steel	Maanshan Iron and Steel Co.	Anhui, Maanshan	3,000
Do.	Shoudu (Capital) Iron and Steel (Group) Co.	Beijing	10,000
Do.	Handan Iron and Steel General Work	Hebei, Handan	2,400
Do.	Tangshan Iron and Steel Co.	Hebei, Tangshan	2,300
Do.	Wuhan Iron and Steel (Group) Co.	Hubei, Wuhan	8,000
Do.	Anshan Iron and Steel (Group) Co.	Liaoning, Anshan	10,000
Do.	Benxi Iron and Steel Co.	Liaoning, Benxi	2,700
Do.	Baotou Iron and Steel and Rare Earth Co.	Nei Mongol, Baotou	3,500
Do.	Baoshan Iron and Steel (Group) Corp.	Shanghai	10,000
Do.	Shanghai Iron and Steel Co. Ltd.	do.	6,000
Do.	Taiyuan Iron and Steel Co.	Shaanxi, Taiyuan	2,500
Do.	Panzhihua Iron and Steel (Group) Co.	Sichuan, Panzhihua	3,000
Lead	Baiyin Nonferrous Metals Co.	Gansu, Baiyin	50
Do.	Shaoguan Smelter	Guangdong, Shaoquan	35
Do.	Jiyuan Smelter (Yuguang Gold-Lead Co. Ltd.)	Henan, Jiyuan	55
Do.	Hanjiang Smelter	Hubei, Luhekou	50
Do.	Shuikoushan Mining Bureau	Hunan, Hengyang	30
Do.	Zhuzhou Smelter	Hunan, Zhuzhou	80
Do.	Shenyang Smelter	Liaoning, Shenyang	70
Do.	Kunming Smelter	Yunnan, Kunming	20
Magnesium	Fushun Aluminum Plant	Liaoning, Fushun	5
Do.	Minhe Magnesium Plant	Qinghai, Minhe	7
Nickel, refined	Jinchuan Nonferrous Metals Corp.	Gansu, Jinchuan	40
Do.	Chengdu Electro-Metallurgy Factory	Sichuan, Chengdu	5
Petroleum, crude	Shengli Bureau	Hebei, Shengli	33,350
Do.	Daqing Bureau	Heilongjiang, Daqing	55,000
Do.	Liaohe Bureau	Liaoning, Liaohe	15,000
Do.	Bohai Offshore Oil Corp.	Bohai	4,000
Do.	Nanhai East Corp.	Nanhai	5,000
Potash	Qinghai Yanhu Industry Group Co. Ltd.	Qinghai	40

See footnotes at end of table.

TABLE 2--Continued
CHINA: STRUCTURE OF THE MINERAL INDUSTRY IN 1999

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies 1/	Location of main facilities	Annual capacity e/
Rare earths	Gansu Rare Earths Co.	Gansu, Baiyin	32
Do.	Jiangxi Rare Earths Co.	Jiangxi, Nanchang	1
Do.	Zhujiang Smelter	Guangdong, Guangzhou	5
Do.	Baotou Iron and Steel and Rare Earths Corp.	Nei Mongol, Baotou	25
Do.	Shanghai Yaolong Nonferrous Metals Co.	Shanghai	2
Salt	Shandong Haihua Group Co. Ltd.	Shandong, Weifang	1,400
Do.	Zigong Zhangjiaba Salt Chemical Plant	Sichuan, Zigong	250
Talc	China National Nonmetallic Industry Corp.	Guangxi, Longshen	130
Do.	do.	Liaoning, Haicheng	50
Do.	do.	Shandong, Qixia	5
Tin, smelter	Dachang Mining Administration	Guangxi, Dachang	5
Do.	Yunnan Tin Industry Co.	Yunnan, Gejiu	20
Do.	Laibin Smelter	Yunnan, Laibin	12
Titanium	Zunyi Titanium Plant	Guizhou, Zunyi	5
Do.	Fushun Aluminum Plant	Liaoning, Fushun	1
Tungsten, concentrate	China National Nonferrous Metals Industry Corp.	Guangdong, Guangxi, Hunan, Jiangxi, and Zhejiang	60
Zinc	Northwest China Lead-Zinc Smelter	Gansu, Baiyin	130
Do.	Shaoquan Smelter	Guangdong, Shaoquan	160
Do.	Liuzhou Zinc Products Factory	Guangxi, Liuzhou	32
Do.	Shuikoushan Mining Bureau	Hunan, Hengyan	28
Do.	Zhuzhou Smelter	Hunan, Zhuzhou	250
Do.	Huludao Zinc Smelting Co.	Liaoning, Huludao	320
Do.	Shenyang Smelter	Liaoning, Shenyang	20
Do.	Laibin Smelter	Yunnan, Laibin	50

e/ Estimated. NA Not available.
1/ Companies are owned by either the state or the provincial government.

TABLE 3
CHINA: EXPORTS OF SELECTED MINERAL COMMODITIES IN 1998

(Metric tons)

	Quantity	Value (thousands)
METALS		
Aluminum:		
Alumina	10,000	$5,239
Metal and alloys:		
Unwrought	206,602	273,192
Semimanufactures	94,796	217,854
Antimony metal, unwrought	44,359	47,238
Barium sulfate	1,290,000	47,074
Copper, metal and alloys:		
Unwrought	103,038	164,637
Semimanufactures	101,974	343,615
Iron and steel:		
Ferrosilicon	350,000	171,894
Pig iron and cast iron	1,620,000	185,509
Steel:		
Bars and rods	440,000	120,900
Shapes and sections	160,000	45,228
Sheets and plates	2,020,000	527,479
Tube and pipe	360,000	345,618
Magnesium carbonate and oxide	2,100,000	232,485
Manganese, unwrought	73,633	70,248
Tin, metal and alloys, unwrought	64,584	314,483
Tungsten:		
Tungstates	10,507	44,180
Ore	80	146
Zinc:		
Metal and alloys, unwrought	527,142	539,050
Oxide and peroxide	68,540	51,140
INDUSTRIAL MINERALS		
Cement	6,360,000	200,917
Fluorspar	1,220,000	115,411
Graphite, natural	205,891	36,758
Talc	710,000	58,478
MINERAL FUELS		
Coal	37,410,000	1,083,747
Coke, semicoke	9,970,000	551,217
Petroleum:		
Crude oil	7,170,000	752,395
Refinery products	6,450,000	1,095,411

Source: China's Customs Statistics (1999.12).

TABLE 4
CHINA: IMPORTS OF SELECTED MINERAL COMMODITIES IN 1999

(Metric tons)

		Quantity	Value (thousands)
METALS			
Aluminum:			
Alumina		1,620,000	$337,912
Metal and alloys, unwrought		534,004	675,748
Semimanufactures		426,952	1,061,926
Scrap		399,268	268,758
Chromium, chromite		820,000	74,310
Copper:			
Ore		1,250,000	474,364
Metal and alloys, unwrought		547,736	884,202
Semimanufactures		631,944	1,594,713
Scrap		1,701,391	476,995
Iron and steel:			
Iron ore		55,270,000	1,378,986
Steel:			
Bars and rods		1,540,000	501,546
Seamless pipe		620,000	544,708
Shapes and sections		250,000	126,825
Sheets and plates		12,200,000	5,549,607
Manganese ore		1,060,000	87,756
INDUSTRIAL MINERALS			
Diamond	kilograms	1,075	449,951
Fertilizers:			
Compound fertilizers		7,860,000	1,583,794
Potassium chloride		5,200,000	608,410
Potassium sulfate		200,000	40,349
Urea		70,000	9,364
Sodium carbonate		35,705	4,904
Titanium dioxide		109,028	184,096
MINERAL FUELS			
Coal		1,670,000	60,858
Petroleum:			
Crude oil		36,610,000	4,641,236
Refinery products		20,820,000	2,697,685

Source: China's Customs Statistics (1999.12).

TABLE 5
CHINA: RESERVES AND RESOURCES OF MAJOR MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodities		Reserves	Resources
Antimony		1,030	2,730
Arsenic		790	2670
Asbestos		32,060	90,440
Barite, ore	million tons	654	3,670
Bauxite	do.	470	2,290
Bentonite	do.	1,030	2,430
Bismuth		200	470
Boron		25,030	47,000
Bromine		136	3,530
Chromite, ore		3,150	9,000
Coal	billion tons	250	1,008
Cobalt		69	476
Copper		25,250	62,740
Diamond, mineral	kilograms	1,800	4,150
Diatomite, ore		102,500	390,000
Fluorite		20,620	108,600
Gas, natural	trillion cubic meters	10	38
Gold	tons	1,040	4,260
Graphite		64,800	173,780
Gypsum, ore	million tons	3,780	57,660
Iodine	tons	7,590	131,100
Iron ore	million tons	20,030	46,230
Kaolin	do.	344	1,440
Lead		11,110	35,310
Magnesite, ore	million tons	127	300
Manganese	do.	208	553
Mercury		21	81
Mirabilite	million tons	9,830	10,640
Molybdenum		3,290	8,390
Nickel		3,260	7,770
Petroleum	billion tons	14	94
Phosphorus, ore	million tons	4,880	13,330
Platinum-group metals	tons	170	310
Potash		139,200	456,400
Pyrite, ore	million tons	1,400	4,410
Rare earths, oxide		29,770	107,400
Salt	billion tons	45	384
Silver		22	117
Sulfur, natural		10,860	321,100
Talc, ore		81,880	250,480
Tin		2,090	3,910
Titanium	million tons	230	390
Trona, mineral		78,760	104,370
Tungsten		2,080	5,270
Vanadium		2,000	26,160
Zinc		33,850	92,570

Sources: China Mineral Resources Report, 1996-98, China Geology and Mineral Resources Yearbook, 1990-97.