

CHINA

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Despite the weakening global economic environment, growth in China remained robust in the 21st century. In 2001, China's gross domestic product (GDP) grew at a rate of 7.3%, which was down from 8% in 2000. Owing to the sluggish Japanese and U.S. economies, China's GDP growth slowed to 6.6% in the fourth quarter from 8.1% in the first quarter in 2001. Domestic and foreign analysts believed that official figures might have overstated reality by a few percentage points, but officials from China's National Bureau of Statistics stated that the reported GDP had been adjusted to provide accurate data (Asian Wall Street Journal, 2002b; Financial Times, 2002a; Washington Post, 2002b).

The structure of the Chinese economy has undergone significant changes in the past decade. Owing to vigorous reforms during this period, China has been transformed from a planned economy to a market economy or a socialist acceptable market economy in Chinese terms. In March, the National People's Congress (NPC) passed the 10th Five-Year Plan, which was a road map for 2001-05 national economic development. The main objective is to boost domestic demand, which contrasts with the goal of combating inflation in the last plan. Rapidly improving per capita income in the coastal Provinces and cities in the past decade has widened disparities in income and living standards between the eastern and inland Provinces. The economic development in the western Provinces would become a major goal of the 10th Five-Year Plan. Given the huge population of more than 700 million in the western and central Provinces, reducing regional disparities will be a formidable task that may take decades to accomplish. The Chinese Government believes that for China to sustain economic development in the future, the economic growth in the inland Provinces must be faster than that of the coastal area. To sustain the growth of the populous inland Provinces at a faster rate than the coastal area will require channeling enormous investment into the inland areas. The inland Provinces have some comparative advantages over the coastal Provinces because inland Provinces have about 85% of the country's most valuable untapped mineral resources. Developing natural resources in the West could increase China's economic development and help reduce regional disparities (Far Eastern Economic Review, 2001).

After 20 years of rapid development, the coastal area has generated an immense demand for raw materials to sustain its growth. A substantial portion of the demand is met by imports. The reason for the failure of the inland suppliers to meet the demand from the coast is the poor transportation links between the inland and coastal Provinces. High transportation costs have made it uncompetitive to bring natural resources from the west to the east compared with importing raw materials. Therefore, the Government planned to invest more than \$858 billion to improve the infrastructure of the inland Provinces in

the 10th Five-Year Plan (Business Weekly, 2002a, c; China Daily, 2002b, d; Far Eastern Economic Review, 2001).

In the 10th Five-Year Plan, the Government has made it clear that the management of the economy would continue to shift away from central planning. The Government has committed to withdrawing from commercially viable industries, and state-owned enterprises would operate purely on the basis of price fluctuations and the desire to maximize profits. The Government intended to maintain its price controls on strategic goods and services, which included crude oil, electricity, grain, and telecommunication services, but controls would be gradually liberalized after accession to the World Trade Organization (WTO). The industry growth pattern will place greater emphasis on efficiency and productivity. The Government has promoted the development of high-technology industries and the upgrade of traditional industries. More resources would be allocated to research activities so that research-and-development expenditure would rise to 1.5% of GDP compared with 0.8% in 1999. The Government set a yearly average GDP growth rate of 7% in the 10th Five-Year Plan, which was less than the average rate of 8.3% achieved during the past 5 years (1996-2000) (Business Weekly, 2002e).

Government Policies and Programs

The People's Bank of China (PBC) established four asset management companies in 1999; these companies purchased a total of \$169 billion nonperforming loans from the state banks by mid-2001, funded mainly through the issuing of Government-guaranteed bonds to the banks (Business Weekly, 2001b). The asset companies were tasked to repackage the nonperforming loans for sale to investors to recover the loan value. Western analysts believed that the total nonforming loans at state banks were \$480 billion. Foreign capital companies, such as Ernst and Young LLP and Swiss bank affiliate UBS Warburg, were assisting asset companies to sell distressed assets to foreign investment companies. The target recovery ratio was 30%. Any difference between the book value of the nonperforming loans and the proceeds recovered by asset companies would be written off by the Government. The Government planned to issue more treasury bonds to cover the losses (Washington Post, 2002c).

The Government approved in principle the draft bill to close down insolvent financial institutions. The closure of financial institutions was a highly sensitive and complex issue because it would affect the confidence of investors, creditors, and depositors. Following China's accession to the WTO, domestic financial institutions were expected to face intensifying competition for high-quality customers' service and transparent accounting system. The goal of the draft bill was to transform banks into competitive modern financial enterprises with the

reform of corporate governance, risk management, and internal controls. International Finance Corp. (IFC) signed a subscription agreement with Nanjing City Commercial Bank to invest \$27 million to hold 15% of the bank. IFC acquired shares in Bank of Shanghai in 1999 and was negotiating with China Minsheng Bank Corp. to acquire a stake in the bank in 2001 (Asian Wall Street Journal, 2002a; China Daily, 2001c, i).

Apart from the restructuring of the banking sector, the ongoing enterprises' reform has put further strains on decisionmakers in China. Since the reform of enterprises began in 1998, more than 40 million workers have been laid off from the state sector as state-owned enterprises sought to improve efficiency and to increase profitability under the restructuring process. For decades, the Government has provided workers with everything, including subsidized education, housing, medical, and pension benefits for life. These benefits usually fell to state-owned enterprises that acted on behalf of the Government. The current pension system, which was set up in 1997, is funded by contributions from employees and employers of state-owned enterprises as well as local governments. Under the system, those who were hired before 1997 and were making only partial contributions during their worklife will not enjoy the full old-age benefits when they retire. Those who had retired before 1997 and had made no contributions are not entitled to any benefits under the system. The unfunded portion of the retirement benefits should be covered by the state-owned enterprises. The program was supposed to be financially sufficient and able to support retirees and the newly unemployed. It was designed to ease the burden on companies and aimed to bring all workers in the Province under a single social welfare umbrella with centralized collection, management, and payment of the funds. With the speeding up of enterprise reform, the number of insolvent state-owned enterprises increased, and these enterprises were unable to meet pension payments. The burden was shifted to the Government. Analysts believed that the Government would contribute as much as \$6 billion to the state pension fund by 2004. With the number of retirees expected to continue to grow in the next several years, the deficit would rise to \$110 billion. The Government planned to sell billions of state-owned equity to help pay for a national social welfare program and allowed social security funds to be invested in stocks. Failure to deliver on promised pensions and medical benefits to retirees and laid-off workers has created social unrest in many areas. In the next several years, the unemployment situation is expected to become worse. The country will face a surplus of labor. In addition to 6 million laid-off workers from state-owned enterprises each year, about 12 million new workers will enter the labor market in the next several years. There are about 150 million surplus rural laborers who enter the cities to look for jobs. In the 10th Five-Year Plan period, analysts predicted that only 8 million jobs would be created yearly (Asian Wall Street Journal, 2001; China Daily, 2001g, 2002d; Far Eastern Economic Review, 2002; Washington Post, 2002a, b).

In 2001, the State Council issued regulations to ban local governments from restricting companies from other regions or Provinces from selling goods and providing services in their administrative areas. Under these regulations, local governments could not impose any discriminative measures

such as differing inspection and technical standards or pricing rules to outside companies. Regional protectionism has been blamed for economic inefficiencies and investment disincentives in the country (China Daily, 2001h).

The Government planned to continue its policy of providing tax incentives for foreign investors, which included those from Hong Kong, Macau, and Taiwan. The income tax for domestic companies is 33%, and that for foreign-funded companies is 17%. The Government will encourage foreign investors to invest in industries that are economically, environmentally, and socially beneficial to the country. The Government has not set any timetable to eliminate dual income tax policy; an antimonopoly bill has, however, been drafted to protect fair competition and will be submitted to the NPC for approval (China Daily, 2002j).

Owing to high oil prices in domestic and international markets, the Government decided to delay the implementation of a fuel tax to 2002 or later. The total value of the fuel tax, the value-added tax, and the consumption tax will account for more than 50% of fuel price. The Government feared the addition of fuel tax would increase prices for consumer goods, especially for farmers in rural areas. The fuel tax would also financially burden domestic oil producers. The fuel tax was part of the Government's tax reform to eliminate irregular levies and to increase tax revenue (China Daily, 2002e).

The All-China Federation of Industry and Commerce planned to introduce a bill to amend the Constitution at the National Committee of the Chinese People's Political Consultative Conference. The bill proposed to include language for the protection of private properties that was similar to that for the state-owned properties. There were more than 1.7 million privately owned enterprises (employing more than 8 workers) that employed more than 27 million workers. Commercial banks were reluctant to provide loans to privately owned enterprises because of the risks involved (China Daily, 2002c).

The State Council promulgated a set of regulations, which is scheduled for implementation on April 1, 2002, to replace the 1997 interim investment guidelines, which divided projects into four categories—encouraged, permitted, restricted, and banned. Investments in agricultural, equipment, and material technologies that have market potential and could help domestic companies improve product quality or international competitiveness are encouraged. For the mineral and metal sector, the Government encouraged foreign investors to invest in the alumina refinery sector with output capacity larger than 300,000 metric tons per year (t/yr); low-grade gold separating and smelting technologies (the Government allows only wholly foreign-funded operation in the western part of the country); and exploration and exploitation of bauxite, coalbed methane, copper, iron, lead, manganese, natural gas, oil, phosphorus, sulfur, and zinc. Advanced application on rare-earth products is also permitted. Foreign investors would be restricted to participation in the development of the rare-earth separating and smelting sector (Sino-foreign joint venture only) and the production of barium salt and the sulfate process to produce titanium dioxide. Exploration and exploitation of antimony, barite, diamond, fluorite, gold, platinum-group metals (PGM), silver, tin, and tungsten are restricted. Industries that would harm national security or pollute the environment were banned.

The State Development and Planning Commission (SDPC) announced that foreign investors, which included investors from Hong Kong, Macau, and Taiwan, were banned from participation in any rare-earth mining activities (Business Weekly, 2002b).

The Government issued guidelines to allow foreign enterprises to conduct mineral exploration in China. Explorers were entitled to extract mineral resources discovered within the exploration area. Expenses for prospecting were considered to be deferred assets and would be amortized during the mining period. To encourage the participation of foreign enterprises in joint ventures with domestic mining enterprises, the Government allowed foreign enterprises to use advanced technologies and equipment as part of their capital in the joint venture or to purchase the prospecting and mining rights. For those engaged in processing tailings in existing mining areas to recover mineral resources, the associated mineral-compensation fee would be reduced to one-half, and those that used minerals from tailings would be exempted from the mineral compensation fee. Foreign investors that used advanced technology in exploiting minerals on the Government's preferred list will be exempted from the mineral compensation fees for 5 years. The Ministry of Land and Resources (MLR) has mapped out a long-term program on the development in the western part of the country. The program sets regulations for the use of land and resources; it also stresses, however, the protection of the environment. The MLR has designated 10 major development areas for exploration and exploitation in the western part of the country. The Tarim Basin will become the largest oil and natural gas production base in the west. Besides oil and natural gas, quality coal resources were discovered in the northern part of the Basin. In the middle reaches of the Yellow River in the Erdos Basin area, a potentially large energy resource base was available for further exploration and development. In the eastern part of the Tianshan and the northern part of the Qilian Mountains, significant amounts of copper, lead, precious metals, and zinc have been discovered. Energy resources, such as oil, natural gas, and uranium might occur in the Turpan-Hami Basin. The Qaidam Basin was expected to become China's major chemical minerals production area. The Qingling area will become a nonferrous metals production base. In the southwestern part of China, many nonferrous metals occurrences were discovered and were available for further exploration and exploitation. The western part of Sichuan Province and the central part of Guizhou Province would become a major production base for bauxite, phosphorus, titanium, and vanadium. The Sichuan Basin was one of the major natural gas production bases in China. Several gold and silver occurrences were discovered in the Hongshuihe and Youjiang areas. In Xizang, one of the largest copper deposits (Yulong) in the country is awaiting for development, and the area will become China's chromite production base (China Economic News, 2001a; China Nonferrous Metals Industry, 2001a).

Production

In 2001, the State Economic and Trade Commission (SETC) promulgated the 10th Five-Year Plan to guide its 13 industrial

sectors in the next 5 years. After 20 years of development, China had reached a point where the industrial sectors needed structural readjustment to compete in the domestic and international markets when China acceded to the WTO. China has been transformed from a planned economy to a socialist acceptable market economy. The 10th Five-Year Plan provided mainly macroguidelines for the development of industrial sectors. Although Baosteel Group Co. was the only company in China that produced more than 10 million metric tons per year (Mt/yr) of steel, steel producers that produced more than 4 Mt/yr were encouraged to consider forming an alliance or merging. The consolidation or merger would help enterprises improve efficiency and productivity and reduce internal competitiveness. Steel producers were urged to upgrade their production lines so that the quality of their products would meet international standards. In 2000, only about 30% of Chinese steel products met international quality standards, and the SETC urged steel producers to improve to 70% by 2005. Owing to the shortage of water resources, the SETC also urged iron and steel output capacities be maintained at current (2001) levels in the northeastern and northwestern parts of the country. With a shortage of domestic iron ore resources, iron producers were encouraged to sign long-term supply contracts or to look for joint-venture possibilities for iron mines in other countries (China Metallurgical News, 2001a).

The SETC's nonferrous metals production targets at yearend 2005 included the following: 6 million metric tons (Mt) of alumina, 3.5 Mt of aluminum, 1.7 Mt each of copper and zinc, 900,000 metric tons (t) of lead, 550,000 t of copper concentrates, 60,000 t each of antimony, rare earths, and tin, and 12,000 t of tungsten. By 2005, China will consume 3.8 Mt of aluminum, 2 Mt of copper, 1.2 Mt of zinc, and 600,000 t of lead. It appears that SETC has set production and consumption targets quite low compared with 2001 output data. Except for alumina, output capacities of other metals in 2001 well exceeded the SETC's 2005 production targets. In the past several years, the Government has tried to control antimony and tin output at 60,000 t each; the outputs of these metals, however, exceeded the Government's plan. In 2001, China had aluminum output capacity of 4.2 Mt, and an additional 1-Mt output capacity was under construction and would be completed in 2003. The Government already approved projects with a total of 2.1-Mt output capacity. The Government encouraged the expansion of alumina output capacity because China's alumina output only met about 60% of the country's needs. The Government urged copper producers to upgrade their smelting and refining equipment and to retire those small smelting furnaces with low efficiency rates for copper recovery and those that damaged the environment. According to the 10th Five-Year Plan guideline, only the Central Government can approve antimony, ionic rare earth, tin, and tungsten mining activities in China. The SETC urged lead and zinc metal producers to maintain their outputs at current (2001) levels because the country exported about 40% of their outputs (China Nonferrous Metals Industry, 2001b).

In the 10th Five-Year Plan, the Government planned to increase gold production to 220 t in 2005; during the 5-year period, China's total gold output would be 1,000 t. The Government predicted that gold resources will increase by 45%;

output capacity at yearend 2005 will increase by 55 t of gold (China Gold, 2002a). The Government urged domestic gold enterprises to form joint ventures with foreign companies for gold exploration and development programs. In China, gold operations are small compared with those in Australia and the United States. By 2005, the Government planned to merge major gold producers into 12 gold groups, which would produce two-fifths of the total production and would improve their competitiveness after deregulation (China Daily, 2002g).

China is the leading cement producer in the world. The Government predicted that the demand for cement would increase to 600 Mt in 2005, of which about 200 Mt would be high-grade cement. Cement producers had retired 3,069 units of shaft kilns and replaced them with more environmentally friendly dry-mixed rotary kilns. In 2005, about 120 Mt of cement will be produced by the dry-mixed method. Each cement producer will produce an average of 250,000 t/yr in 2005, which is a 150,000-t increase from that of 2000. The consumption of fertilizer, phosphate rock, sulfuric acid, pyrite, and soda ash will increase to 46 Mt, 38 Mt, 30 Mt, 12 Mt, and 8.5 Mt, respectively. The development of potash resources in Qinghai Province and Xinjiang Uygur Autonomous Region is one of many priorities in the western part of the country (Building Materials Industry Information, 2001; China Metallurgical News, 2001b).

The Government predicted that the consumption of natural gas would increase more than either coal or petroleum between 2001 and 2005. The demand for natural gas will increase to 70 billion cubic meters in 2005 from 26 billion cubic meters in 2000. Facing environmental issues and the restructuring of energy configuration, domestic coal demand was predicted to increase by only 20 Mt/yr. The percentage ratio of washed coal will increase to 50% in 2005 from 35% in 2000, and the quantity of coal exports will also increase. China has geologic oil resources of 3.8 billion metric tons (Gt), of which 850 Mt is recoverable. In 2005, the country will produce 170 Mt of oil and 50 billion cubic meters of natural gas and will import about 25 Mt of oil.

In 2001, owing to supply exceeding demand, the Government announced that the production of antimony, asbestos, barite, fluorite, magnesite, mercury, molybdenum, rare earths, tin, and tungsten will be strictly controlled. The Government also banned any new pyrite mine construction projects. The quantity and quality of coal production was also under Government control. The Government urged coal producers to mine high-quality coal and to limit the production of high-ash and high-sulfur coal (China Nonferrous Metals News, 2001r).

Trade

After 15 years of negotiation, China finally signed an accession agreement in November 2001 at Doha, Qatar. In lengthy negotiations with WTO members, China agreed to reduce tariff rates and to eliminate import quotas. Foreign companies will compete on a more level playing field against Chinese companies. During the next several years, tariffs levied on imported minerals and metals will fall dramatically. The Ministry of Foreign Trade and Economic Cooperation (MOFTEC) established three departments—WTO Affairs,

China WTO Notification and Enquiry Center, and the Fair Trade Bureau for Import and Export—to undertake any issues related to the WTO (Business Weekly, 2001d).

China's producers were expected to face pressure not only from imported goods but also more importantly from removal or reduction of subsidies. Under the terms of the WTO agreement, subsidies paid upon export performance or those provided for domestically produced inputs in preference to imported products would be removed. Following accession, state-owned trading enterprises would be placed on equal treatment with domestic and foreign companies and individuals within 3 years. All transactions by state-owned trading enterprises would take place on a commercial basis; no favorable conditions could be accorded for purchase or sale of goods; this included transactions on imports and exports. State-owned enterprises, however, would continue to be permitted for five categories of agricultural products (grain, vegetable oils, sugar, tobacco, and cotton), crude and processed petroleum, and chemical fertilizers. A number of agricultural products, minerals (steel and steel products), and labor-intensive manufactured goods could be exported by state-owned trading enterprises until 2005. For service sectors, such as telecommunications and banking, foreign investment would be progressively liberalized, and foreign ownership would gradually increase from 25% to 49% within 3 years in certain cities. Within 5 years, all geographical restriction would be abolished. Analysts predicted that China's accession to the WTO would generate a surge in exports. Trade liberalization could lead to a significant expansion of exports in a number of sectors, such as electronics and light industry products, because of improved market access. For the short term, the new trading opportunities for China would be mainly in labor-intensive manufactures and in the labor-intensive segments of the production process of high-tech manufactures. China's imports of a number of capital- and technology-intensive products would increase. Countries, such as Japan and the United States, and trade associations, such as the European Union (EU), were expected to increase their exports of these products (China Daily, 2002f, h).

The MOFTEC issued a list of commodities, which included some ferrous and nonferrous metals, that required export quota license control in 2002. Commodities that were on the Government's monitor list were ammonium paratungstate; bauxite and refractory clay; concentrates of antimony, tin, tungsten, and zinc; oxides of antimony and tungsten; platinum; rare earths; refractory magnesium; silver; and unwrought tin and zinc. Most export quotas were controlled and distributed by the MOFTEC, but the rare-earth quotas were determined by the SDPC and were distributed by the SETC, and the MOFTEC issued the licenses. Antimony was exported through the ports of Beihai, Huangpu, and Tianjin (China Land and Resources News, 2002). According to customs statistics, total trade reached \$509.8 billion in 2001; this was an increase of 7.5% compared with that of 2000. Exports posted an increase of 6.8% to \$266.2 billion, and imports went up by 8.2% to \$243.6 billion. Asian countries, which were China's largest export market, accounted for 52.6% of total exports followed by North America with 21.6% (the United States accounted for 20.6%). The iron and steel trade was valued at \$13.8 billion; nonferrous metals, \$9.5 billion; and nonmetallic minerals, \$7.3 billion. In

2001, imports, such as alumina, aluminum and its products, copper, copper ore, chromium ore, crude oil, diamond, and iron ore, increased by more than 10%. Exports of aluminum and its products, barium sulfate, cement, coal, coke, graphite, manganese, and talc increased (General Administration of Customs of the People's Republic of China, 2001).

Commodity Review

Metals

Aluminum.—The SETC issued a circular to inform local governments that the central Government would not support any new aluminum projects, greenfield or expansion. Local governments were directed not to approve any greenfield projects without consultation with the central government. The central Government only supported aluminum projects that would replace obsolete Soderberg cells. The SETC predicted that China would produce 5.5 Mt of aluminum in 2005. In 2001, 22 projects were underway that would add 1 Mt to existing capacity in 2003, and another 23 projects were being approved. If all approved projects are built and completed, then China will have output capacity of 7 Mt/yr of aluminum in 2005. The Government estimated that China would consume 3.8 Mt of aluminum at the end of the 10th Five-Year Plan period; analysts, however, predicted that aluminum consumption would be higher than the Government's projection. Because of supply exceeding demand in China, domestic aluminum price declined from 16,240 yuan per metric ton (\$1,963 per metric ton) in 2000 to 14,350 yuan per metric ton (\$1,735 per ton) in 2001. In 2001, China was a net exporter of 68,740 t of unwrought aluminum. The Government predicted that if the production of aluminum continuously increased, the domestic aluminum price would decline further in 2002 and 2003. Exports of aluminum from China were expected to increase in the future, and that would affect the aluminum price in the international market (China Daily, 2002k; China Nonferrous Metals Industry, 2002a; China Nonferrous Metals News, 2001m).

The Government decided to continue providing 8% preferential tariff on alumina imports for China National Metals and Minerals Import and Export Corp. (Minmetals) in 2002. The preferential tariff applied only to long-term contracts. Minmetals had alumina import contracts with Alcoa and Billiton of Australia. In 2001, because alumina demand exceeded supply, China was required to import 3.3 Mt of alumina (China Metals, 2002d).

In 2001, China Aluminum Industry Corp. (Chinalco), which was established by the Government to manage the alumina and major aluminum producers in China, established a subsidiary, Aluminium Corp. of China Ltd. (Chalco), which was listed in Hong Kong and New York stock markets in December. Chinalco transferred most of its assets to Chalco before the initial public offering. The offering was managed by Morgan Stanley and China International Capital Corp. The offering consisted of 10% to retail investors, and the remaining 90% was being marketed to institutional investors. Chinalco maintained the largest shareholder with 45.1%. Other shareholders include China Cinda Asset Management Corp., 15.3%; China Orient

Asset Management Corp. 5.7%; China Development Bank, 5.3%; Guangxi Development and Investment Co. Ltd., 1.8%; Guizhou Provincial Materials Development and Investment Corp., 1.2%; Alcoa International (Asia) Ltd. (Alcoa) (a subsidiary of Alcoa Inc. of the United States) 8%; and others, 17.6%. China's state-owned companies maintained a 74.4% share of Chalco (China Daily, 2001b; Mining Journal, 2001b).

In November 2001, Alcoa and Chalco agreed to form a strategic alliance. The total investments were expected to be \$1 billion. Alcoa had subscribed to 8% of Chalco's offering share and would hold its subscribed shares for at least 30 months. According to the agreement, Alcoa and Chalco would form a 50-50 joint venture. Chalco was the sole metallurgical alumina producer in China. Chalco used Pingguo Aluminum Co.'s assets as its contribution share, and Alcoa would provide funds for Pingguo's expansion. Plans included an increase of alumina output capacity from 400,000 t/yr in 2001 to 800,000 t/yr in 2003 and aluminum output capacity from 130,000 t to 335,000 t by 2006. The alliance was expected to help Chalco transform into a multinational company and to allow Alcoa to participate in the continuously growing aluminum market in China. Alcoa had five joint-venture/wholly owned fabrication plants in China, and all output was sold in domestic markets (China Nonferrous Metals News, 2001p; Mining Journal, 2001a).

The feasibility study committee approved the construction of a 100,000-t/yr refinery in Yuanping City, Shanxi Province. The cost for the Jinbei Aluminum Refinery was estimated to be \$350 million, and the construction would take about 3 years to complete. The Yuanping area has a significant amount of bauxite reserves, and Shanxi Province is rich in coal reserves, accounting for one-fifth of the country's total coal output. The committee submitted the plan to the SDPC for approval (China Nonferrous Metals News, 2002e).

Nonferrous Metal Corp. of China and Vietnam National Mineral Corp. signed a memorandum of understanding (MOU) to develop the bauxite deposit in Dac Nong District of Dac Lac Province, Vietnam. Bauxite reserves at Dac Nong were estimated to be between 4 and 5 Gt. Government officials from China and Vietnam were considering building a 1-Mt/yr alumina refinery in DacLak Province, Vietnam. The total investment was estimated to exceed \$1 billion (Metal Bulletin, 2001b, 2002b; Mining Journal, 2002a).

Antimony.—China was the largest antimony producer in the world, and its output accounted for more than 70% of the world total. The quantity of antimony output and exports from China affects the world antimony price. The Chinese Government issued guidelines to reform the antimony sector, designated three ports for antimony exports, and intended to shut down all illegal miners and producers. Export licenses and quotas were issued to credited exporters, and traders were allowed to source antimony products only from legal producers. In 1991, the Government designated antimony as a protected commodity, and the MLR announced that it would not issue any new mining licenses in 2000. In the past several years, these actions had never shown any positive effect in slowing down illegal mining and exports. Even if illegal mining were stopped completely, there would still be sufficient legal output capacity within China to meet the world demand. Domestic analysts estimated that

China exported at least 30,000 t/yr of antimony illegally (China Nonferrous Metals News, 2001a).

On July 17, 2001, illegal mining caused one of the worst mining incidents in China. Illegal miners accidentally blew up a protection wall, and water flooded into Longquan Mining Co.'s two underground mines, Lajiapo and Longshan, in Dachang District, Nandan County, Guangxi Zhuang Autonomous Region. More than 200 people were trapped in the mines, and 81 people were confirmed dead (China Daily, 2001j). In the late 1980s, Guangxi No. 215 Geologic Team discovered the No. 105 ore body, which is located close to the No. 100 ore body, which the Government assigned to Gaofeng Mining Co. [a subsidiary of Liuzhou Huaxi (China Tin) Group], a state-owned enterprise in Nandan County. Fuyuan Mining Exploration Co. was owned by the Nandan County government and received an exploration license from the MLR to explore the surrounding area of No. 100 and No. 105 ore bodies in 1996 (Zhongguo Guotu Ziyuan Bao, 2001a). Longquan was a collectively owned enterprise and was officially awarded a contract by Fuyuan for the exploration work. The No. 105 ore body is a polymetallic deposit containing antimony, lead, tin, and zinc, and its grade and size are similar to those of the No. 100 ore body. Fuyuan held 15% interest in Longquan and shares in five other mining companies. Instead of exploration, these companies mined the No. 105 ore body illegally. Mining activities were done after dark and usually manually. In Nandan, there were more than 200 illegal mining activities, employing nearly 30,000 workers. There were at least 23 illegal mining companies conducting their mining activities in the Gaofeng Mine (No. 100 ore body) area, which caused a lot of damage and many accidents. Since 1991, Huaxi had spent a large amount of its operation funds to repair and to protect the mine and requested the Government to clamp down on these illegal activities; the result, however, was minimum. After the accident, the Government destroyed all illegal mines and closed down illegal processing plants and smelters in Nandan County, and activity at the No. 105 ore body was shut down. Senior executives of Gaofeng, Longquan, Huaxing Mining Co. Ltd., and Xinzhou Tin Mine and senior county officials of Nandan were either imprisoned or sentenced to death for trying to cover up the accident, taking bribes, and abusing power. Former senior Guangxi No. 215 Geologic Team members were also convicted of providing geologic data about the No. 105 ore body to Fuyuan illegally (China Nonferrous Metals News, 2001i, j, k, l, 2002h; Zhongguo Guotu Ziyuan Bao, 2001a, b; Zhonggu Meitan Bao, 2001a).

Since the accident and enforcement on illegal exports, the market price of antimony increased to about \$1,100 per metric ton at yearend from \$1,000 per ton in July. During that period, the demand for antimony remained weak, and there was sufficient antimony outside China to satisfy low demand. In the fourth quarter, domestic market price for antimony concentrates increased to 2,600 yuan per ton (\$314 per ton), and ingot went up to 8,000 yuan per ton (\$967 per ton) in October from 1,800 yuan per ton (\$218 per ton) and 6,000 yuan per ton (\$726 per metric ton) in August, respectively. If the Government continues to shut down illegal antimony activities in the Provinces of Guangxi, Guizhou, Hunan, and Yunnan and to tighten antimony exports, then the market price of antimony will rise in 2002 and

later years in the international market as antimony demand increases (China Nonferrous Metals News, 2001n).

Copper.—Owing to economic expansion, the production and consumption of copper in China continued to grow. In 2001, China's copper consumption was estimated to be 2 Mt and was expected to increase from about 2.8 Mt to 3.0 Mt in 2005, which was higher than the Government projection. The increase of copper consumption was from the construction, electrical appliances, and power sectors. The output of domestic copper mines could not meet the copper smelters' needs; therefore, China was required to import a large quantity of copper concentrates from Australia, Chile, Mongolia, and Peru. Imported copper concentrates accounted for more than 50% of the total demand. Even though geologists have discovered several mid-sized copper deposits in the western part of the country recently, the shortage of copper concentrates was expected to continue in the future. In 2001, China's copper output capacities were semimanufacturing, 2.58 Mt; refining, 1.60 Mt; smelting, 1.21 Mt; and concentrates, 600,000 t. There was a big gap between upstream and downstream output capacities, and this gap was expected to become larger. China could become one of the largest copper importing countries in the world, and the International Copper Association established an office to monitor the development of the copper sector in China (China Nonferrous Metals News, 2001b, c; 2002d).

In September 2000, managers from six state-owned copper producers (Baiyin, Daye, Jiangxi, Tongling, Yunnan, and Zhongtiaoshan) agreed to form an alliance to unify the import of copper concentrates into China. The alliance did not receive Government approval. Since the disbanding of China National Nonferrous Metals Corp. and China Copper, Lead, and Zinc Corp., Minmetals was in charge of copper imports and supplied them to copper producers on commission basis. In 2001, Minmetals and five copper producers (Daye, Jiangxi, Tongling, Yunnan, and Zhongtiaoshan) agreed to form a company, China United Copper Co. Ltd., to negotiate collectively for copper concentrate imports. The new company desired to invest in copper exploration and mining in other countries. The Government intended to approve the establishment of China United Copper Co. Ltd. in 2002 with operations beginning immediately (China Nonferrous Metals News, 2002k; Metal Bulletin, 2001a).

In 2001, the Government approved Jiangxi Copper Co.'s third-phase expansion plan. By the end of 2002, the Guixi Smelter's copper output capacity would be doubled to 400,000 t/yr. The output capacities of sulfuric acid, silver, and gold will increase to 1.03 Mt/yr, 158 t/yr, and 7.8 t/yr, respectively. Its subsidiary, Jiangxi Copper Co. Ltd., offered 230 million A shares in the Shanghai Stock Exchange in December 2001. The company planned to invest part of the \$63 million raised to modernize the Guixi Smelter, to acquire the Wushan mine, and to develop the Fujiawu mine. The company also decided to expand its downstream production capacity. A 150,000-t/yr copper rod mill and a 8,000-t/yr copper sheet mill were planned for installation in Guixi City in 2003. The company had planned to resume mining at the No. 7 ore body in the Dongxiang Mine. Owing to a mud slide in 1996, the pit was shut down. The restart of the No. 7 ore body mining was

expected to produce 800 metric tons per day (t/d) of ore and a total of 2,700 t/yr copper-in-concentrate. The company's Yongping Mine had installed a heap-leaching process to extract copper from low-grade ore (0.10%-0.37%) at its mine site and was designed to produce 1,000 t/yr of copper metal. The mine produced about 1.3 Mt/yr of low-grade ore (China Metals, 2001b; China Nonferrous Metals News, 2001e, f, q).

China Nonferrous Metals Industry Association and Chile's Copper Association signed a MOU to cooperate on the copper development in two countries. Cooperation included mining and smelting technology, investment information, and trade (China Nonferrous Metals News, 2001d).

Gold and Silver.—China's gold market remained controlled by the Government, which required that all gold output, mined and smelted, be sold to the PBC at a fixed price. In 1993, the Government allowed foreign investors to form joint ventures with domestic gold producers to participate in gold mining but only in mines with either low-grade ore or ore that required advanced smelting technology. In 2001, the Government decided to establish a gold exchange in Shanghai and began trial runs on November 28. The exchange had 108 members from producers/consumers, traders, and commercial banks. Membership was not open to foreign-funded companies. The initial trial runs were set for 3 months, but they might extend to a longer period to ensure smooth transactions. The exchange will operate via an electronic platform and will only trade in physical gold, in bars that weigh 1 kilogram (kg), 3 kg, and 12.5 kg. Derivative trade is off at the present time, but it may be introduced in the future if the State Council approves. The PBC is the sole bank that can trade gold in China; however, this may change because the Government allows the Shanghai Gold Exchange to import and export gold via its members. The Bank of China, the China Construction Bank, and the Industrial and Commercial Bank of China are members of the Shanghai Gold Exchange and may import and export gold and may even hedge on overseas gold exchanges. The PBC will retreat from the gold market completely to become a monetary bank (China Gold, 2001b; China Metals, 2001a; Mining Journal, 2001c).

Gold production continued to expand in 2001. According to the PBC, the bank purchased 181.3 t; this figure, however, did not include illegal gold production and trading data. Many domestic and international analysts believed that gold production should be higher than that reported by the PBC. According to the World Gold Council, gold consumption in China was 207.5 t in 2000 and 213.2 t in 2001, and Gold Fields Mineral Services reported that China's gold production and consumption were 162 t and 184 t, respectively (Mining Journal, 2001d). Domestic gold analysts believed that China's consumption of gold ranged from 250 to 300 t in 2000 (China Gold, 2001a). The Government did not report any gold bullion import and export data; therefore, it is very difficult to figure out the apparent gold consumption in China. Many gold traders in Hong Kong reexported their imported gold to China undetected.

On June 16, Sino Mining Ltd. of Australia and Deyang Mining Co. of the Sichuan Geology and Mineral Resources Bureau signed a contract to explore gold in the Hongyuan-Ma'erkang area in Aba Prefecture, Sichuan Province. According to the terms of agreement, Sino Mining will invest a

total of \$14.5 million for exploration, of which the company was required to invest at least \$5 million in prospecting in the first 5 years to earn 51%, or \$14.5 million, to earn 75% of the joint venture. If the discovery could be commercially developed, then the two parties would jointly develop the deposit to produce 100,000 ounces (2,835 kg) of gold each year, and each share would be based on each company's prospecting share. Initial prospecting indicated that Hongyuan-Ma'erkang area had good potential for large gold resources (Zhongguo Guotou Ziyuan Bao, 2001d).

The operation of Shanghai Huatong Silver Market ran smoothly in the past 2 years. Owing to the expansion of copper, lead, and zinc output, silver production also increased sharply. According to regulations, silver trades should be performed at the silver market; many silver trades, however, were done outside the silver market so that producers could avoid paying the value-added tax that the Government imposed on March 17, 2000 (China Gold, 2001c). Domestic silver output exceeded demand, and China relied on silver exports to balance domestic supply and demand. In 2001, the Government increased the silver export quota to 1,180 t and approved 5 more companies for a total of 15 companies have silver export licenses. By yearend, according to customs statistics, China exported 198.9 t and imported 19.9 t of unwrought silver. In 2001, China consumed about 1,200 t of silver and had a large amount of surplus silver in the domestic market. Price per kilogram of No. 1 grade (99.95% Ag) silver decreased to 1,190 yuan (\$143.90) at yearend from 1,375 yuan (\$166.30) in January. Unless China can expand its export markets and increase domestic consumption, some of its silver producers may be forced to shut down their operations (China Gold, 2002b; China Nonferrous Metals Industry, 2002b).

Iron and Steel.—China was the second largest iron ore importer in the world. Owing to high production costs, low returns on investment, and low ore grades in domestic iron deposits, steel enterprises continued to look for joint-venture possibilities for iron mines in other countries. The Ministry of Finance and the State Taxation Administration with the State Council approval jointly decided to reduce resource tax on integrated iron and steel producers' iron mines from 15 yuan per ton (\$1.81 per ton) to 6 yuan per ton (\$0.73 per ton), which would take effect on April 1, 2002. The original tax rate was implemented in 1994. The Government reduced the tax rate for independent iron mines to 6 yuan per ton in late 1990s, but that for integrated iron and steel producers' iron mines remained the same. Integrated iron and steel producers had no impetus to increase iron ore production under this condition because the total tax accounted for 26% of the sale, and imported iron ores had fewer impurities, such as silicon oxide and phosphorus. Iron and steel producers in the coastal areas preferred imported iron ore rather than domestic iron ore because prices of imported iron ore were very competitive in the coastal areas. The tax cut may not have immediate incentive for mine producers to increase their output (China Metals, 2002a).

Shanghai Krupp Stainless Steel Co. Ltd., which was a joint venture between Thyssen Krupp and Shanghai Pudong Iron and Steel (Group) Co. Ltd. of the Baosteel Group, completed its first-phase construction and started production in November

2001. The first-phase construction was designed to produce 72,000 t/yr of cold-rolled stainless strip at a cost of \$294.8 million. Thyssen-Krupp held 60% of the interest, and Pudong had 40%. The company planned to expand the output capacity to 500,000 t/yr of crude steel, 460,000 t/yr of hot-rolled coil, and 268,000 t/yr of coil/sheet in 2005. The total cost of the three-stage project was estimated to be \$1.43 billion, and \$1 billion would be financed by the International Financial Corp. and the German Financing Institute. Besides the Shanghai project, Thyssen Krupp had a joint venture with Anshan Iron and Steel (Group) Co. to build a 400,000-t/yr galvanizing sheet facility. Construction of the plant began in February 2001 and was expected to be completed in 2003 (China Metals, 2001d).

Construction of the west-to-east natural gas pipeline was expected to consume about 3.7 Mt of high-quality steel. The first round of bidding for 170,000 t of U-ing O-ing Expanding (UOE) pipes was completed, and PetroChina awarded Euro Pipe 115,000 t, Sumitomo Metal 40,000 t, and Nippon Steel 15,000 t. The requirements for UOE pipes were 1,016 millimeters in diameter, X70 strength level, and resistance to hydrogen-induced cracking. None of the domestic steel producers was able to produce this kind of pipe. Next bidding was for 150,000-t of hot-rolled coils and 10,000-t-thick plates. Baosteel was selected to be the sole source in China to supply high-strength and high-ductile steel for the west-to-east pipeline project (China Metals, 2001e).

The Guangzhou Iron and Steel Group planned to build a greenfield steel plant in Nansha Longxu Island, outside Guangzhou City, to replace the current one. The local government had planned to use the current Guangzhou Steel Plant site for commercial development. The proposed steel plant will have 5-Mt/yr of output capacity, which doubles the current one, at an estimated cost of \$7.25 billion. Zhujiang Steel Plant (a subsidiary of the Guangzhou Iron and Steel Group) planned to expand its output capacity to 2 Mt/yr. The \$126 million expansion project will add a 150-t electric-arc furnace, a 150-t ladle furnace, a 150-t vacuum-oxygen decarburization furnace, and a thin-slab continuous casting mill (China Metals, 2002c).

Lead and Zinc.—The production of lead and zinc continued to increase in 2001, and China's net imports of lead and zinc concentrates were 396,901 t and 639,490 t, respectively (China Metal Market, 2002a). The Government continued its crackdown on illegal mining activities in the Guangxi area, which led to a much tightened supply of lead and zinc concentrates in China. The depressed metal market conditions had a great influence on mining operations. The depleted concentrates stockpile in China forced lead and zinc producers into an increasing reliance on imported raw materials. Zinc producers, such as Huludao Zinc Smelting Co., Liuzhou Zinc Products, and Zhuzhou Smelter, expressed their concerns about the concentrates shortage. Huludao closed its No. 3 plant in July 2001 and has not yet reopened it. The supply shortage of lead and zinc concentrates was expected to continue in 2002 because about 30,000 t of production capacity was shut down in 2001 in the Provinces of Guangxi and Shaanxi, and production was not resumed in 2002. Usually, Huludao and Zhuzhou depended on supplies of concentrates from the Provinces of

Guangxi, Nei Mongol, Qinghai, and Shaanxi; a number of mines in these Provinces, however, have developed smelting capacities, which reduced concentrates shipment to these smelters. The depressed metal market price and shortage of raw material forced Huludao, Shaoguan, and Zhuzhou to reduce their outputs in 2001 and 2002 (China Metal Market, 2001).

In 2000, Shenyang Xingye Trading and Technological Co. acquired the bankrupted Shenyang Smelter, which faced raw material and fund shortages, for \$24.6 million. The smelter planned to produce 50,000 t of refined copper, 50,000 t of lead, and 20,000 t of zinc in 2001. The smelter was shut down in late 2001, and no date had been set to resume production in 2002. Before the Shenyang Smelter declared bankruptcy, officials of Shenyang City had tried to close down the smelter for environmental problems. Shenyang Xingye proposed to install environmental protection equipment at the smelter and to reduce emission of polluted gas to the air (Metal Bulletin, 2002d).

Hebei Hua Ao Mining Development (a subsidiary of Griffin Mining Ltd. of the United Kingdom) was granted a mining license by the Chinese Government to develop the Cajiaying zinc and gold deposit in Nei Mongol. The company planned to develop the Cajiaying deposit, which has average grades of 12.3% zinc, 0.7 gram per metric ton (g/t) gold, and 48 g/t silver, into a 180,000-t/yr production mine. The company planned to continue its exploration in the area to pursue further resources (Metal Bulletin, 2002c).

Molybdenum.—China was one of the largest molybdenum-producing countries in the world. Each year, China exported about 80% of its molybdenum products mainly in the form of ferromolybdenum and molybdenum oxide. In 2000, the European Union investigated China's ferromolybdenum export practices and imposed dumping duties of 3.6% to 26.2% on Chinese ferromolybdenum products in 2001. The China Chamber of Commerce of Metals, Minerals, and Chemical Importers and Exporters set up a task committee to coordinate and to respond to the charges. The committee imposed an export limit of 8,861 t on ferromolybdenum to the EU market from August 8, 2001, to February 28, 2002 (China Nonferrous Metals News, 2001h).

Facing a dumping charge and weak demand in Japan, China's molybdenum producers had difficulty maintaining a profitable margin. Because supply exceeded demand, the price of molybdenum concentrates was sluggish in the domestic market. China consumed about 10,000 t of molybdenum; the special steel sector accounted for about 8,000 t. The special steel sector has been expanding in China, and the consumption of molybdenum will increase in the future (China Nonferrous Metals News, 2001s).

Researchers from China and Russia successfully developed a flotation method to recover associated scheelite from the molybdenum-tungsten deposit in Luanchuan, Henan Province. The recovery rate of scheelite was 71%, and the concentrate contained 53% tungsten. In the past 10 years, the Luoyang Luanchuan Molybdenum Group Co. Ltd. had invested a significant amount of research funds to solve the problem. The Luanchuan deposit contains 650,000 t of tungsten in scheelite form (China Nonferrous Metals News, 2001o). Luoyang Luanchuan and Ximen Tungsten Co. Ltd. agreed to form a 40-

60 share joint venture, Luoyang Yulu Mining Co. Ltd., to build a 10,000-t/d processing mill to recover scheelite from the ore. Ximen, which was a tungsten semimanufactured products producer in Ximen, Fujian Province, has sourced raw materials from domestic tungsten producers (China Nonferrous Metals News, 2001g).

Nickel.—In 2001, Jinchuan Nonferrous Metals Corp. completed its copper expansion project. The corporation had an annual output capacity of 400,000 t of sulfuric acid, 60,000 t of copper, 60,000 t of nickel, 1,200 t of cobalt, and 1,000 kg of PGM. China produced about 50,000 t of nickel and consumed more than 75,000 t of nickel; therefore, the country had to import nickel to meet its shortage. The stainless steel sector was the largest consumer, which accounted for 60% of total nickel consumption in China. Several stainless steel producers planned to expand their output capacities, and the demand for nickel was expected to increase sharply in the next several years. Jinchuan planned to invest \$360 million to expand the production of sulfuric acid to 600,000 t/yr, copper to 100,000 t/yr, cobalt to 2,000 t/yr, PGM to 1,500 kilograms per year by 2005. The company was undertaking mining expansion, which was expected to take several years to complete. The company's mine production could not meet the demand; therefore, the company was forced to import nickel and copper concentrates from the Kalatongke Mine in Xinjiang Uygur Autonomous Region and Mongolia and cobalt from Cuba. After more than a year of exploration, the company discovered more nickel and copper resources, at grades of 2.33% and 1.28%, respectively, at 1,220 meters below the ground level in the northwestern part of its Longzhou Mine (China Metals, 2001c; China Nonferrous Metals News, 2002b, f, g).

Jinchuan and Titan Resources NL of Australia were discussing forming a joint venture to apply Titan's bioheap-leaching metallurgical process for nickel and copper recovery commercially. The joint venture would construct and operate a trial heap of 200,000 t in the first stage. If the pilot project proved successful, then the project would expand to 1 Mt/yr in 2004 and rise to 1.8 Mt/yr. Titan would hold 75% interest in the company (Mining Journal, 2002b).

In 2001, Jilin Geological Prospecting Bureau and Inco Mining Co. of Canada signed an agreement to explore nickel resources jointly in Jilin Province. Inco would contribute \$10 million to account for 60% of the share of the joint venture, and Jilin would provide the prospecting right and existing geologic data (Zhongguo Guotu Ziyuan Bao, 2001c).

Tin.—China was the largest tin-producing country in the world and exported about 60% of its total output. Owing to weak demand and depressed tin prices in the international market, China's unwrought tin exports decreased by more than 26% to 45,803 t, and tin alloy exports also reduced by more than 29% to 10,816 t. China consumed about 48,000 t of tin, of which tin solder accounted for 50%. Domestic tin consumption was expected to increase slowly but steadily in the next several years because of the expanded demand for tin from the electronics sector (China Metal Markets, 2002b).

Yunnan Tin Industry Group Co., which was the largest tin producer in China, shut down its operation between May and

July for maintenance. The company's initial plan was to shut down for a month, but the market conditions forced the company to extend for another month, and the tin metal output was reduced by 4,000 t to 22,000 t in 2001. The company planned to increase production to 28,000 t in 2002 (depending on market conditions and the operation conditions of the newly installed Ausmelt furnace). Yunnan Tin supplied 60% of its concentrates from its own mines and the rest from local mines in Yunnan. Owing to a Nandan flooding incident and the decline of the tin concentrate supply in Guangxi area, Huaxi (China Tin) Group Co. also reduced its tin output to about 17,000 t in 2001 and planned to produce 20,000 t in 2002. Since the Nandan accident, the Government has cracked down on most of illegal mining activities in Guangxi and Yunnan. The supply of tin concentrates from these two Provinces may be more constrained in 2002. China may be required to source tin concentrates from the world market (China Nonferrous Metals News, 2002i; Zhongguo Guotu Ziyuan Bao, 2001e).

Tungsten.—Even though China was the leading tungsten-producing country in the world and its output accounted for more than two-thirds of the world total, the country had difficulty holding tungsten prices stable in the domestic and international markets. The Government and the tungsten producers meet yearly to find a way to maintain tungsten market price and to control production. The Government forced major tungsten producers to reduce their output, to close down illegal mining, and to set a tungsten export quota. Legal exporters reached a consensus on setting floor prices for major tungsten products. With all these actions taken, prices of tungsten could only be held for a short period in the international markets. The average price per metric ton of ammonium paratungstate was held at about \$90 in 2000 and in the first half of 2001 but declined to about \$60 at yearend 2001. The MLR and the SETC sent joint inspection teams to enforce the closure of illegal tungsten mines. The MLR issued circulars to publicize the Government's position on illegal tungsten mining in China. According to the circulars, new mine operating licenses, which could not be transferred, were issued in June 2001; the Government issued 129 tungsten mining licenses. Illegal tungsten mining operations and exports continued in 2001. The Government had banned export of tungsten concentrates in 1999; according to Japan customs statistics, however, Japan imported 20 t of tungsten concentrates from China in the first 9 months of 2001, and the United States imported 903 t, but there was no record on tungsten concentrate exports in China customs statistics. Even as the Government has urged tungsten producers to reduce their output in the past several years, the production of tungsten continued to grow. In 2001, according to the China Nonferrous Metals Industry Association report, the output of tungsten concentrates increased by 9.16% compared with that of 2000, and the 2000 output was 22.84% higher than that of 1999. The Government urged tungsten producers to control tungsten concentrate output at 45,000 t in 2002, and processing plants were not allowed to source tungsten concentrates from unauthorized miners. As a measure to control exports, the Government awarded 15 enterprises tungsten export rights in 2002. The Government may face a very difficult task controlling the production of tungsten under

the market economy system. Also, because so many small-scale tungsten producers are unaccounted for in the country, the total production of tungsten will be higher than the Government's target in 2002 (Business Weekly, 2002d; China Nonferrous Metals News, 2002c; Metal Bulletin, 2002a).

In December, the Government set a total tungsten export quota at 17,000 t (W content) for 2002. The approved producers were the Huaxi Hard Alloy Plant, the Langfang Tungsten and Molybdenum Plant, the Nanchang Hard Alloy Plant, Xiamen Tungsten Co., the Zhuzhou Hard Alloy Plant, and the Zigong Hard Alloy Plant. The export quota share of each producer will be based on its output capacity. Producers will be restricted to exporting only their own products, and traders must source tungsten products from authorized operating producers and miners. The China Chamber of Commerce of Metals, Minerals, and Chemicals Importers and Exporters will verify contracts between producers and traders and export prices, and then the MOFTEC will issue an export license (China Metals, 2002b).

In December 2001, Shizhuyuan Nonferrous Metals Co. Ltd. and Zhuzhou Hard Alloy Plant jointly invested \$17.7 million to build a 10,000-t/yr tungsten smelter to produce tungsten oxide. The joint-venture company's (Binzhou Diamond Tungsten Co. Ltd.) smelter will be located at Binzhou, Hunan Province, and the construction was expected to take 2 years to complete. One of China's polymetallic mines, the Shizhuyuan Mine, has the processing capacity of 770,000 t/yr of ores that contain bismuth, lead, molybdenum, silver, tungsten, and zinc. The mine has recoverable reserves of 684,100 t of tungsten and 263,800 t of bismuth. Because of technical problems, the metals recovery rate was only 30%. Shizhuyuan has contracted research institutions to develop a new extraction method to improve the recovery rate (China Nonferrous Metals Industry, 2001c; China Nonferrous Metals News, 2002a).

Industrial Minerals

Potash.—China is a potassium-deficient country and needs to import a large quantity of potassium compounds for its fertilizer sector. The Government has offered incentives such as tax relief to encourage the production of potash fertilizer so that the country could be less dependent on imports of potash fertilizer. In 2001, Qinghai Yanhu Potash Industrial Group Co. started constructing its 300,000-t/yr potash fertilizer plant in Qinghai. The company secured a \$57.2 million loan from the Industrial and Commercial Bank of China, and the balance of \$281 million was expected from other sources. The company's goal was to produce 1.5 Mt/yr of potassium fertilizer in 2005. Besides Qinghai Yanhu, there were several potassium projects in Qinghai that were either in planning or awaiting approval from the Government. Mahai Salt Lake's 150,000-t/yr potassium fertilizer project was scheduled to begin construction in 2002. Dayantan's 50,000-t/yr potassium sulfate project was submitted to the Government for approval. Zhongxin Guoan Lithium Technology Co. Ltd. had successfully extracted boron, lithium, magnesium, and potassium individually from Taijinaier brine. By 2005, Qinghai Province was expected to produce 1.7 Mt/yr of potassium chloride, 100,000 t/yr of potassium sulfate, 50,000 t/yr of magnesium, 20,000 t/yr of strontium carbonate,

15,000 t/yr of boric acid, and 10,000 t/yr of lithium carbonate (Economic Daily, 2001; Zhongguo Guotu Ziyuan Bao, 2001f).

In 2001, the Government approved the Xinjiang Lop Nur Potassic Salt Scientific and Technological Development Co.'s plan to invest \$88 million to construct a 200,000-t/yr potassium sulfate and a 50,000-t/yr potassium nitrate plant in Luozhong, Ruoqiang County, Xinjiang Uygur Autonomous Region. The proposed plant was scheduled to be completed in 2003. The company was considering expanding the output capacity to 1.2 Mt/yr by 2010. Lop Nur Lake has potential potassium salt resources of 250 Mt, of which 100 Mt is recoverable reserve. MLR allocated \$1.2 million to further explore the Lop Nur Lake (China Chemical News, 2001; China Nonferrous Metals News, 2001t).

Rare Earths.—China was the largest rare-earth producer and exporter in the world. The country exported more than two-thirds of its output. In 2001, China produced about 80,000 t of ore (in rare-earth oxide content) and 71,000 t of rare-earth products. Of the total rare-earth concentrate output, Nei Mongol accounted for more than 60% followed by Sichuan, 18%, and Jiangxi, 17%. There were 170 rare-earth smelters with a total smelting capacity of 180,000 t/yr in China, and most of them were in the Provinces of Jiangsu, Jiangxi, Nei Mongol, and Sichuan. In 2001, the country consumed about 20,000 t of rare earths, which was about 25% of the world total consumption (China Nonferrous Metals News, 2002j).

Since 1995, China has become the dominant rare-earth producer and has supplied more than 80% of the world's rare earths, such as concentrates, intermediate products, and chemicals. Because of overproduction and exports, supply exceeded demand in domestic and international markets, and China's rare-earth producers have been struggling to maintain a profitable margin in recent years. In 2001, China exported 46,200 t of rare-earth products, which was a 1.1% decline from that of 2000, but the value of rare-earth products decreased by 33% to \$207 million. In the past, more than two-thirds of Chinese rare-earth products was shipped to France, Japan, and the United States; owing to declining demand, however, these countries accounted for only 50% of the total exports in 2001. In 1998, the Government set up a rare-earth export quota system and assigned the ratio of metal and metal oxide to salt as 19.9% to 80.1%; the ratio, however, changed to 58.6% to 41.4% in 2001. The Government urged rare-earth producers to export more high-value-added products. The weak demand for rare earths in the international market and oversupply in domestic market affected rare-earth prices in 2001. Per tonnage price of rare-earth chloride, which the Government banned for export, declined to 8,000 yuan (\$967) in August from 10,500 yuan (\$1,270) in January; rare-earth carbonate to 6,800 yuan (\$822) from 9,500 yuan (\$1,149); and neodymium oxide to 50,000 yuan (\$6,046) from 116,000 yuan (\$14,027). Many rare-earth producers either shut down completely for maintenance or operated at 50% of their output capacities (China Nonferrous Metals News, 2002i).

Mineral Fuels

The plan to open up China's tightly controlled power sector might be delayed. The Government wanted to ensure that the

reform would not create any electricity supply shortage as in California. The goal of this plan was to break up the virtual monopoly of State Power Corp. (SPC). The powerplants of SPC will be regrouped into three or four power companies that will take over the operation of powerplants. Huaneng Power (Group) Corp., which was under SPC, would become an independent power-generating company. The power grid owned by SPC will be regrouped into two new companies, State Power Grid Corp. and South China Power Grid Corp. China opened its power-generation market to foreign investors in 1985 to help solve power shortages. Under the terms of the agreement, foreign investors were allowed to have a fixed percentage profit margin for 10 to 20 years. Foreign companies may be allowed to invest in the grid; they will not, however, be involved in transmission. In the past several years, grid construction investment accounted for 60% of the total investment in the power sector (China Daily 2001d).

Coal.—China continued to reform its coal sector in 2001. The Government closed down an additional 58,000 small coal mines, which reduced the overall coal output capacity by 200 Mt. China exported more than 90 Mt of coal, which was an increase of 63% compared with that of 2000; the coal went mainly to Japan, the Republic of Korea, and Taiwan (General Administration of Customs of the People's Republic of China, 2001, p. 24). As a result of closing small coal mines and increasing coal exports, coal supply in some areas tightened. The coal demand in such sectors as chemical, construction, metallurgy, and power generation increased. At yearend 2001, coal prices increased to 150 yuan per ton (\$18.10 per ton) from 140 yuan per ton (\$16.90 per ton) at the end of 2000. The increase in coal prices in the domestic market and coal exports helped many state-owned coal producers improve their cashflows and reduce their deficits. After so many years in financial loss, the coal sector finally became profitable in 2001. The Government will continue its effort to control total output of coal and to shut down illegal mines. Coal exports were expected to increase to 100 Mt in 2002. In 2001, the Government encouraged coal producers to export coal by extending policies, which included a reduction in port charges and the exemption of railway construction fees on four major coal transportation routes until 2003. Domestic coal demand was expected to increase to 1.05 Gt, and the country would produce 1.15 Gt in 2002 (China Daily, 2002a).

In 1998, the Government transferred all state-owned coal producers under the supervision of the former Ministry of Coal Industry to the Provincial governments. It planned to merge about 520 state-owned coal producers into seven groups so that they could compete in the international market. According to the Government plan, the seven coal groups will become enterprises and will be listed on international stock markets. These seven groups will be placed under the State Council and will not be controlled by Provincial governments. The seven groups will be Jing (Beijing)-Jin (Tianjin)-Ji (Hebei Province), East China, Northeast China, Central and South China, Southwest China, Xin (Xinjiang Uygur Autonomous Region)-Gan (Gansu Province)-Ning (Ningxia Hui Autonomous Region)-Qing (Qinghai Province), and Jin (Shanxi Province)-Meng (Nei Mongol Autonomous Region)-Shaan (Shaanxi

Province). The Shenhua Group, the Yanzhou Mining Group, and the Datong Coal Mine Group should be the core companies in forming these coal large enterprises. After the accession to the WTO, domestic coal producers were expected to face greater competition from imported coal, especially in the coastal Provinces where coal demand exceeded supply (Business Weekly, 2001c).

The Government continued its efforts to improve coal mine safety in China. The State Administration of Coal Mine Safety Supervision and the State Administration of Safety in Production Supervision were established under the SETC to oversee the country's coal mine production safety. The Government had intensified its efforts to enforce coal mine safety regulations. Twenty Provinces had set up coal mine safety supervision offices to enforce mine safety under their jurisdictions and had shut down more than 6,800 coal mines for safety violations. Because of profit temptation, many coal mines restarted their operations after the inspection team left. Owing to inadequate safety protection, many accidents occurred in county-level coal mines. In the first 11 months of 2001, there were 2,629 coal mine accidents, and 5,005 miners died. The county-level coal mines accounted for more than 70% of accidents and deaths. The Government issued \$65.3 million in treasury bonds to upgrade safety in 84 state-owned coal mines (Business Weekly, 2001a; China Daily, 2001h, 2002i).

Shenhua Group Co. Ltd., which was the largest coal enterprise in China, completed the construction of its first-phase integrated coal mining facility at yearend 2001. The \$6 billion project included the construction of the Dongsheng and Jungar Coal Mines and a 800-kilometer (km) railway link to Huanghuagang. The Shenhua Group was established in October 1995 by the Government to oversee Dongsheng Coal Industry Corp. and Jungar Coal Industry Corp. and the construction of Huanghuagang. The two mines have a total output capacity of 40 Mt/yr of low-sulfur and low-ash coal and a 15-Mt/yr coal washing plant. The second-phase construction will add 60 Mt/yr of output capacity and expand railway transportation capacity to 68 Mt of coal to the east coastal seaport in 2005. The company planned a public offering in either domestic or international stock markets to raise funds to pay for its debts. The group's debts accounted for 76% of its asset value (Zhongguo Meitan Bao, 2001b).

To prevent explosion, China's coal mines emitted about 6 billion cubic meters per year of methane. To prevent pollution and to recover energy resources, the Government planned to recover methane from the coal mines. The MOFTEC and Canadian International Development Agency signed a MOU to develop jointly the carbon-dioxide-enhanced coalbed methane recovery technology. Each side would contribute \$3 million to the development work. In the next 3 years, three tests would be performed in three locations to evaluate the technology (China Daily, 2002b).

Oil and Gas.—China's oil and gas sector has undergone major changes in the past several years. The Chinese Government reorganized the onshore oil and gas sector into two integrated enterprises—China National Petroleum Corp. (CNPC) and China Petrochemical Corp. (Sinopec). China National Offshore Oil Corp. (CNOOC) was left to handle

offshore exploration and production, and China National Star Petroleum was placed under Sinopec. China National Chemicals Import and Export Corp. received the exclusive right from the Government to trade oil. During the same period, three state-owned oil and gas enterprises were regrouped, and three holding companies were set up—PetroChina Ltd. under CNPC, Sinopec Corp. Ltd. under Sinopec, and China Offshore Oil Co. Ltd. under CNOOC, which offered shares on the stock markets of Hong Kong and New York. International oil companies, such as BP Amoco PLC, ExxonMobil Corp., and the Royal Dutch/Shell Group, bought major shares in the international initial public offerings. Each investment was accompanied by separate agreements to cooperate in such areas as oil and gas exploration and marketing and distributing of oil products. Funds from the share issuing were used mainly to repay debts and help pay for future projects (China Daily, 2001e).

Because the rapid economic growth increased the demand for oil, China has become more dependent on oil imports to balance supply and demand. In 2001, China's net crude oil and oil product imports were more than 61 Mt. Imported crude oil accounted for one-third of the total demand. The quantity of crude oil imports decreased by 14.2%, but refined oil products increased by 18.9% in 2001 compared with that of 2000. In 2001, crude oil from Iran increased by 55% to 10.8 Mt; Iran replaced Saudi Arabia as the largest crude oil supplier to China. Crude oil from Saudi Arabia increased to 8.8 Mt. African countries supplied about 22% of China's total imported crude oil. About 90% of Chinese oil output came from onshore wells. Daqing Oilfield in Heilongjiang Province, which began production in 1963, produced more than 50 Mt/yr of crude oil and was expected to continue at this output level until 2010; this accounted for about one-third of the country's total output. The future hope for increased oil output was from the western oilfields. In Xinjiang, the verified oil and natural gas reserves were 2.5 Gt and 700 billion cubic meters, respectively, in 2000, and potential oil and natural gas resources were 20.9 Gt and 10.3 trillion cubic meters, respectively. According to the Government's plan, Xinjiang would produce a total of 80 Mt of crude oil in 2008. Explorations in the Junggar, Tarim, and Tuha Basins were continuing, and geologists believed that there would be more oil and natural gas resources in these basins. Harsh weather and environmental extremes in the west, however, may deter the rate of development there. Demand for crude oil was expected to grow at a higher rate than domestic production in the future; this means that China will be more dependent on oil imports. China signed agreements with neighboring countries, such as Russia and Turkmenistan, to exploit gasfields and oilfields jointly in Irkutsk and Sakhalin Island in Siberia and to import oil and gas from Russia and Turkmenistan (China Chemical Reporter, 2001; China Economic News, 2001b).

To speed up domestic oil and gas production, PetroChina prepared to offer a total of 18 blocks in the Ordos, Songliao, and Tarim Basins for foreign investors. The potential exploitation of these blocks could account for 20% of the company's total output. One of these block was for risk exploration; foreign investors would cover all exploration costs and share the discovery with PetroChina in case of any

commercial development. The remaining blocks were for production improvement. PetroChina signed 49 contracts with foreign oil companies, but there were not many successful exploration results (China Daily, 2001a).

PetroChina awarded three foreign oil companies/groups (ExxonMobil, Royal Dutch/Shell, and Russian Gazprom and Stroiltransgaz) and Sinopec to construct jointly a 4,200-km gas pipeline to transport 10 billion cubic meters of natural gas from the Tarim Basin to Shanghai. According to the feasibility study, powerplants will take up to 50% of the total transmitted natural gas. The estimated cost for the pipeline project was \$15 billion, and the pipeline was planned to be fully operational by 2005 (Financial Times, 2002b).

Sinopec and CNOOC signed an agreement to explore and develop jointly the West Lake Sag area in the East China Sea. Since 1980, the Shanghai Offshore Oil Bureau of Sinopec Star Petroleum Co. has drilled 32 wells, of which 21 proved to have potentially high-yield commercial oil and natural gas. In the 1980s, the Government allowed CNOOC and PetroChina to cooperate with foreign oil companies to explore and develop offshore and onshore oil and natural gas, respectively. The Government revised the regulation to allow Sinopec to cooperate with foreign investors on onshore oil and natural gas projects (China Daily, 2001f).

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TABLE 1
CHINA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/ METALS	1997	1998	1999	2000	2001
Aluminum:					
Bauxite, gross weight thousand tons	8,000	8,200	8,500	9,000	9,800
Alumina, gross weight do.	2,940	3,330	3,840	4,330	4,650
Metal, refined, primary and secondary do.	2,180	2,440	2,810	2,990 r/	3,570
Antimony:					
Mine, Sb content	131,000	97,400	89,600	110,000 r/	150,000
Metal	120,000	82,000	84,500	106,000	148,000
Bismuth:					
Mine output, Bi content	550	240	2,680	1,120 r/	1,250
Metal	760	820	860	770 r/	1,230
Cadmium, smelter	1,980	2,130	2,150	2,370 r/	2,510
Cobalt:					
Mine output, Co content	200	40	250	90 r/	150
Metal	470	410	300	410 r/	450
Copper:					
Mine output, Cu content	496,000	487,000	520,000	593,000 r/	587,000
Metal:					
Smelter, primary	789,000	839,000	837,000	1,020,000 r/	1,150,000
Refined					
Primary thousand tons	801	870	836	1,020	1,220
Secondary do.	379	340	344	350	300
Total do.	1,180	1,210	1,180	1,370 r/	1,520
Gold, mine output, Au content	175	178	173	180	185
Iron and steel:					
Iron ore, gross weight thousand tons	268,000	247,000	237,000	223,000 r/	220,000
Pig iron do.	115,110 4/	118,600 4/	125,390 4/	131,010 r/ 4/	155,540 4/
Ferrous alloys do.	4,040 4/	3,558 4/	3,810	4,030	4,500
Steel, crude do.	108,940 4/	115,590 4/	124,260 4/	128,500 r/ 4/	151,630 4/
Steel, rolled do.	99,780 4/	107,380 4/	121,100 4/	131,460 4/	160,680 4/
Lead:					
Mine output, Pb content	712,000	581,000	549,000	660,000 r/	676,000
Metal:					
Smelter, primary	467,000	567,000	597,000	830,000 r/	840,000
Refined					
Primary	584,000	665,000	821,000	998,000	984,000
Secondary	123,000	92,000	97,000	102,000	211,000
Total	707,000 r/	757,000	918,000	1,100,000 r/	1,200,000
Magnesium metal, primary	76,000	70,500	120,000	190,000 r/	200,000
Manganese ore, gross weight thousand tons	6,000	5,300	3,190	2,640 r/	2,500
Mercury, mine output, Hg content	830	230	200	200	190
Molybdenum, mine output, Mo content	33,300	30,000	29,700	28,800 r/	28,200
Nickel:					
Mine output, Ni content	46,600	48,700	49,500	50,300 r/	51,500
Matte	39,900	47,000	50,100	57,000 r/	57,000
Smelter	43,300	40,100	44,400	50,900	49,500
Silver, mine output, Ag content	1,300	1,300	1,360 r/	1,600	1,910
Tin:					
Mine output, Sn content	67,500	70,100	80,100	99,400 r/	95,000
Metal, smelter	67,700	79,300	90,800	112,000 r/	105,000
Titanium, sponge	2,340	2,250	1,660	1,900	2,470
Tungsten, mine output, W content	25,000	30,000	31,100	37,000	38,500
Vanadium (in vanadiferrous slag product)	15,000	15,500	26,000	30,000	30,000
Zinc:					
Mine output, Zn content thousand tons	1,210	1,270	1,480	1,780 r/	1,700
Refined, primary and secondary do.	1,430	1,490	1,700	1,980 r/	2,040

See footnotes at end of table.

TABLE 1--Continued
CHINA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/	1997	1998	1999	2000	2001
INDUSTRIAL MINERALS					
Asbestos	288,000	314,000	247,000	320,000 r/	360,000
Barite thousand tons	3,500	3,300	2,800	3,500	3,600
Boron, mine, boron oxide equivalent	136,000	137,000	110,000	145,000 r/	150,000
Bromine	50,100	40,000	42,000	42,000	40,000
Cement, hydraulic thousand tons	511,730 4/	536,000 4/	573,000 4/	597,000 r/ 4/	661,040 4/
Diatomite	330,000	335,000	340,000	350,000	350,000
Dolomite thousand tons	6,500	6,700	6,600	6,700	6,700
Fluorspar do.	2,300	2,350	2,400	2,450	2,450
Graphite	310,000	224,000	300,000	430,000 r/	450,000
Gypsum thousand tons	9,100	6,800	6,700	6,800	6,800
Kyanite and related materials	3,000	3,050	3,000	3,100	3,150
Lithium minerals, all types	17,000	16,000	15,500	16,000	16,000
Magnesite thousand tons	2,400	2,400	2,450	4,070 r/	3,580
Nitrogen, N content of ammonia do.	24,700 r/	25,800 r/	28,300 r/	27,700 r/	28,200
Phosphate rock and apatite, phosphorus oxide equivalent do.	7,530	7,500	6,000	5,820	6,300
Potash, marketable, potassium oxide equivalent do.	115	120	260 r/	380 r/	385
Rare earths, rare-earth oxide equivalent	53,000	60,000	70,000	73,000	81,000
Salt thousand tons	30,830 4/	22,420 4/	28,124 4/	31,280 4/	34,105 4/
Sodium compounds: soda ash, natural and synthetic do.	7,258 4/	7,440 4/	7,654 4/	8,342 4/	9,144 4/
Sulfur:					
Native do.	230 r/	230 r/	280 r/	290 r/	290
Content of pyrite do.	6,040	4,490	3,860	3,370	3,090
Byproduct, all sources do.	1,400	1,450	1,630 r/	1,900 r/	2,000
Total do.	7,670 r/	6,170 r/	5,770 r/	5,560 r/	5,380
Talc and related materials do.	4,100	3,800	3,900	3,500	3,500
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Anthracite do.	242,000	229,000 r/	182,000 r/	176,000 r/	195,000
Bituminous do.	1,050,000	960,000	822,000	781,000 r/	920,000
Lignite do.	57,200	50,800	45,600	42,000 r/	45,000
Total do.	1,350,000	1,240,000	1,050,000	999,000 r/	1,160,000
Coke, all types do.	137,310 4/	128,060 4/	121,100 4/	121,840 r/ 4/	131,310 4/
Gas, natural:					
Gross billion cubic meters	23	23	25	27	30
Marketed do.	18	18	20	22	24
Petroleum:					
Crude (including crude from oil shale) million 42-gallon barrels	1,180	1,200	1,190	1,200	1,210
Refinery products do.	1,150 r/	1,140 r/	1,370 r/	1,580 r/	1,570

r/ Revised.

1/ Table includes data available through August 30, 2002.

2/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

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

4/ Reported by China's State Statistical Bureau.

TABLE 2
CHINA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies 1/	Location of main facilities	Annual capacity e/
Aluminum:			
Alumina	Pingguo Aluminum Co.	Guangxi, Pingguo	450
Do.	Guizhou Aluminum Plant	Guizhou, Guiyang	520
Do.	Changcheng (Great Wall) Aluminum Corp.	Henan, Zhongzhou	760
Do.	do.	Hunan, Zhengzhou	1,000
Do.	Shandong Aluminum Plant	Shandong, Zibo	850
Do.	Shanxi Aluminum Plant	Shanxi, Hejin	1,400
Metal	Baiyin Aluminum Plant	Gansu, Baiyin	50
Do.	Lanzhou Aluminum Plant	Gansu, Lanzhou	95
Do.	Liancheng Aluminum Plant	do.	90
Do.	Pingguo Aluminum Co.	Guangxi, Pingguo	130
Do.	Guizhou Aluminum Plant	Guizhou, Guiyang	240
Do.	Jiaozuo Wanfang Aluminum Co. Ltd.	Henan, Jiaozuo	170
Do.	Luoyang Xin'an Aluminum Smelter	Henan, Luoyang	55
Do.	Sanmenxia Tianyuan Aluminum Co. Ltd.	Henan, Sanmenxia	40
Do.	Hanjiang Danjiangkou Aluminum Co. Ltd.	Hubei, Danjiangkou	70
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	240
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	Shanxi, Taiyuan	30
Do.	Yunnan Aluminum Plant	Yunnan, Kunming	120
Antimony	Huaxi (China Tin) Group Industrial Co.	Guangxi, Hechi	25
Do.	Xikuangshan Antimony Co. Ltd.	Hunan, Lengshuijiang	25
Asbestos	China National Nonmetallic Industry Corp.	Nei Mongol, Baotou; Shanxi, Lai Yuan, and Lu Liang	130
Barite	do.	Guizhou, Xiangshou	NA
Coal	Hebei Provincial Government	Hebei	70,000
Do.	Heilongjiang Provincial Government	Heilongjiang	100,000
Do.	Henan Provincial Government	Henan	100,000
Do.	Liaoning Provincial Government	Liaoning	70,000
Do.	Nei Mongol Provincial Government	Nei Mongol	90,000
Do.	Shandong Provincial Government	Shandong	60,000
Do.	Shanxi Provincial Government	Shanxi	400,000
Do.	Sichuan Provincial Government	Sichuan	80,000
Do.	Shenhua Coal Corp.	Ningxia, Nei Mongol, and Shaaxi	40,000
Cobalt	tons Jinchuan Nonferrous Metals Corp.	Gansu, Jinchang	1,200
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	60
Do.	Luoyang Copper Processing Factory	Henan, Luoyang	50
Do.	Daye Nonferrous Metals Co.	Hubei, Daye	150
Do.	Guixi Smelter (Jiangxi Copper Metals Co.)	Jiangxi, Guixi	400
Do.	Huludao Copper Smelter (Huludao Zinc Smelting Co.)	Liaoning, Huludao	100
Do.	Shanghai Smelter	Shanghai	80
Do.	Taiyuan Copper Industry Co.	Shanxi, Taiyuan	30
Do.	Zhongtiaoshan Nonferrous Metals Co.	Shanxi, Yuangu	80
Do.	Tianjin Copper Electrolysis Factory	Tianjin	25
Do.	Yunnan Smelter	Yunnan, Kunming	160
Gas, natural	billion cubic meters China National Petroleum Corp.	Sichuan	10
Gold, refined	tons China National Gold Corp.	Henan, Lingbao	10
Do.	do. Laizhou Gold Co.	Shandong, Laizhou	15
Do.	do. Zhaoyuan Gold Co.	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 2001

(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) Mining 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. (Wugang)	Hubei, Wuhan	5,100
Do.	Banshigou Iron Mine Mining Co.	Jilin, Hunjiang	1,400
Do.	Anshan Mining 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.	Shanxi, Taiyuan	4,000
Do.	Dabaoshan Mining Co.	Guangdong, Qujiang	1,670
Do.	Panzhuhua Mining Co.	Sichuan, Panzhuhua	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. (Shougang)	Beijing	8,500
Do.	Handan Iron and Steel General Work (Handan)	Hebei, Handan	2,400
Do.	Tangshan Iron and Steel Co.	Hebei, Tangshan	2,300
Do.	Wuhan Iron and Steel (Group) Co. (Wugang)	Hubei, Wuhan	8,000
Do.	Anshan Iron and Steel (Group) Co. (Angang)	Liaoning, Anshan	8,500
Do.	Benxi Iron and Steel Co. (Bengang)	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. (Baosteel)	Shanghai	13,000
Do.	Shanghai Iron and Steel Co. Ltd.	do.	6,000
Do.	Taiyuan Iron and Steel Co. (Taigang)	Shanxi, Taiyuan	2,500
Do.	Panzhuhua Iron and Steel (Group) Co. (Pangang)	Sichuan, Panzhuhua	3,000
Lead	Baiyin Nonferrous Metals Co.	Gansu, Baiyin	50
Do.	Shaoguan Smelter	Guangdong, Shaoguan	100
Do.	Yubei Metal Smelter	Henan, Anyang	150
Do.	Jiyuan Wangyang Nonferrous Smelter	Henan, Jiaozuo	45
Do.	Jiyuan Smelter (Yuguang Gold-Lead Co. Ltd.)	Henan, Jiyuan	200
Do.	Hanjiang Smelter	Hubei, Luhekou	50
Do.	Shuikoushan Mining Bureau	Hunan, Hengyang	80
Do.	Zhuzhou Smelter	Hunan, Zhuzhou	100
Do.	Kunming Smelter	Yunnan, Kunming	100
Magnesium	Fushun Aluminum Plant	Liaoning, Fushun	5
Do.	Minhe Magnesium Plant	Qinghai, Minhe	7
Molybdenum, concentrate	Luanchuan Molybdenum Co.	Henan, Luanchuan	8
Do.	Jinduichang Mining Corp.	Shaanxi, Huaxian	9
Nickel, refined	Jinchuan Nonferrous Metals Corp.	Gansu, Jinchuan	60
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.	Nanghai East Corp.	Nanghai	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 2001

(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	Laibin Smelter [Huaxi (China Tin) Group Industrial Co.]	Guangxi, Laibin	25
Do.	Pinggui Mining Bureau	Guangxi, Zhongshan	8
Do.	Yunnan Tin Industry Co.	Yunnan, Gejiu	55
Titanium	Zunyi Titanium Plant	Guizhou, Zunyi	5
Do.	Fushun Aluminum Plant	Liaoning, Fushun	1
Tungsten, concentrate	Shizhuyuan Nonferrous Metals Co.	Hunan, Chenzhou	5
Do.	Yaogangxian Tungsten Mine	Hunan, Yizhang	3
Do.	Nanchang Co.	Jiangxi, Nanchang	15
Zinc	Northwest China Lead-Zinc Smelter	Gansu, Baiyin	150
Do.	Shaoquan Smelter	Guangdong, Shaoquan	170
Do.	Liuzhou Zinc Products Factory	Guangxi, Liuzhou	100
Do.	Shuikoushan Mining Bureau	Hunan, Hengyan	60
Do.	Zhuzhou Smelter	Hunan, Zhuzhou	300
Do.	Huludao Zinc Smelting Co.	Liaoning, Huludao	330
Do.	Laibin Smelter	Yunnan, Laibin	60

e/ Estimated; estimated data are rounded to no more than three significant digits. NA Not available.

1/ Companies are owned by either the central Government or the Provincial government.

TABLE 3
CHINA: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2001

	Quantity (metric tons)	Value (thousands)
METALS		
Aluminum:		
Alumina	30,000	\$8,917
Metal and alloys:		
Unwrought	408,829	591,148
Semimanufactures	135,645	337,723
Antimony metal, unwrought	22,007	26,128
Barium sulfate	2,590,000	80,652
Copper, metal and alloys:		
Unwrought	54,125	93,325
Semimanufactures	123,772	421,234
Iron and steel:		
Ferrosilicon	490,000	227,611
Pig iron and cast iron	680,000	81,909
Steel:		
Bars and rods	940,000	228,165
Scrap	9,673	2,204
Shapes and sections	380,000	97,531
Sheets and plates	1,760,000	514,758
Tube and pipe	390,000	355,891
Magnesium carbonate and oxide	2,110,000	274,621
Manganese, unwrought	116,460	119,221
Tin, metal and alloys, unwrought	57,249	249,448
Tungsten: tungstates	6,850	51,552
Zinc:		
Metal and alloys, unwrought	562,021	539,773
Oxide and peroxide	92,720	66,640
INDUSTRIAL MINERALS		
Cement	6,210,000	195,604
Fluorspar	1,110,000	121,948
Graphite, natural	372,375	48,501
Talc	770,000	69,212
MINERAL FUELS		
Coal	90,120,000	2,666,388
Coke, semicoke	13,890,000	928,240
Petroleum:		
Crude oil	7,550,000	1,385,369
Refinery products	9,220,000	2,127,397

Source: General Administration of Customs of the People's Republic of China, 2001, China monthly exports and imports, no. 12.

TABLE 4
CHINA: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2001

(Metric tons unless otherwise specified)

	Quantity	Value (thousands)
METALS		
Aluminum:		
Alumina	3,350,000	\$624,889
Metal and alloys, unwrought	529,419	735,208
Semimanufactures	404,120	1,118,521
Scrap	369,208	242,408
Chromium, chromite	1,090,000	80,979
Copper:		
Ore and concentrates	2,260,000	897,995
Metal and alloys, unwrought	954,167	1,575,588
Semimanufactures	740,625	1,931,312
Scrap	3,334,567	1,242,305
Iron and steel:		
Iron ore	92,310,000	2,502,751
Steel:		
Bars and rods	740,000	402,704
Scrap	9,790,000	1,061,503
Seamless pipe	820,000	707,320
Shapes and sections	200,000	114,196
Sheets and plates	1,488,000	7,343,413
Manganese ore	1,710,000	131,068
INDUSTRIAL MINERALS		
Diamond kilograms	1,762	681,399
Fertilizers:		
Compound fertilizers	5,470,000	905,411
Potassium chloride	5,170,000	603,629
Potassium sulfate	260,000	43,069
Sodium carbonate	69,665	7,887
Titanium dioxide	153,122	281,216
MINERAL FUELS		
Coal	2,490,000	87,502
Petroleum:		
Crude oil	60,260,000	11,666,450
Refinery products	21,450,000	3,769,398

Source: General Administration of Customs of the People's Republic of China, 2001, China monthly exports and imports, no. 12.

TABLE 5
CHINA: RESERVES AND RESERVE BASE OF MAJOR MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodities	Reserves	Reserve base
Antimony, Sb	791	2,400
Arsenic, As	750	2,470
Asbestos, mineral	31,500	90,000
Barite, ore	million tons 62	360
Bauxite	do. 695	2,290
Bentonite	do. 673	2,440
Bismuth, Bi	240	470
Boron, B ₂ O ₃	25,000	46,600
Bromine, Br	133	3,510
Cadmium, Cd	90	380
Chromite, ore	3,650	10,000
Coal	billion tons 413	1,006
Cobalt, Co	72	470
Copper, Cu	26,400	62,800
Diamond, mineral	kilograms 1,780	4,040
Diatomite, ore	110,300	406,000
Fluorite, CaF ₂	20,620	108,600
Gallium, Ga	tons 2,700	98,100
Gas, natural	billion cubic meters 1,180	3,800
Gold, Au	tons 1,200	4,130
Graphite, mineral	64,000	218,000
Gypsum, ore	million tons 4,250	57,800
Iodine, I	tons 3,980	117,900
Iron ore, ore	million tons 21,300	45,800
Kaolin	do. 344	1,440
Lead, Pb	10,900	36,000
Lithium, Li ₂ O	1,170	2,300
Magnesite, ore	million tons 1,310	3,000
Manganese, ore	do. 217	548
Mercury, Hg	20	80
Mirabilite, Na ₂ SO ₄	million tons 990	10,600
Molybdenum, Mo	3,280	8,340
Nickel, Ni	3,580	7,640
Petroleum	million tons 2,490	9,400
Phosphorus, ore	million tons 6,640	13,250
Platinum-group metals, metal	tons 23	304
Potash, KCl	14,460	456,000
Pyrite, ore	million tons 1,540	4,740
Rare earths, rare-earth oxide	27,000	88,640
Salt, NaCl	billion tons 47	405
Silver, Ag	26	115
Sulfur, natural	10,870	321,100
Talc, ore	74,400	238,500
Tantalum, Ta ₂ O ₅	36	84
Tin, Sn	1,700	3,550
Titanium, TiO ₂	million tons 198	351
Trona, mineral	76,000	103,000
Tungsten, WO ₃	2,240	5,280
Vanadium, V ₂ O ₅	8,550	25,830
Zinc, Zn	32,900	92,100

Sources: China Land and Resources Almanac 1999-2000.