

THE MINERAL INDUSTRY OF CHINA

By Pui-Kwan Tse

During the past two decades, China avoided the instability and output declines of such countries as Mongolia and Russia, that were transformed from central planning economies to market economies. This stability was attributed to the Government's ability to set and guide the gradual economic reform. Even with the outbreak of severe acute respiratory syndrome (SARS) in the second quarter of the year, China's gross domestic product (GDP) increased by 9.1% to \$1.41 trillion, and the per capita GDP rose to \$1,092 in 2003. Investment was the main driver for the growth. In 2003, fixed investments expanded by 26.7% to \$625 billion, of which foreign direct investment accounted for \$53.5 billion. Public sector investment accounted for 72.1% of total investments, which was an increase of 28.2% compared with that of 2002. The living standards of rural and urban households improved, but the income gap between these households widened. Per capita income increased by 9.0% in urban areas but by only 4.3% in rural areas. Companies in the coastal provinces experienced a shortage of skilled workers and soaring wages even as tens of millions of agricultural workers remained underemployed. The urban unemployment rate rose to 4.3% in 2003 from 4.0% in 2002. If laid-off state-owned enterprise (SOE) workers who had not been reemployed were included, then the unemployment rate would be about 8%. The Government projected that the economic growth rate was 7% in 2004, which was about 2% lower than that of 2003. The consumer price index increased by 1.2% in 2003, which reversed the deflationary trend of 2002; the increase was mainly driven by food and services. In the second half of 2003, the price of raw materials, such as aluminum, cement, and iron and steel, increased by double-digit rates, and the higher producer prices were expected to be passed on, thus pushing consumer product prices higher in 2004 (China Economic News, 2004a, b; Hong Kong and Shanghai Banking Corp. Ltd., 2004).

In 2003, despite China's enormous achievements in growth, poverty reduction, and stability, there were some shortcomings. China's air and water were heavily polluted, and grasslands, which cover about 40% of the landmass, were seriously degraded. Enterprises and related reforms were not complete. The reform of social benefits formerly provided by the SOEs, such as lifetime employment and education, health care, housing, and pensions for workers and their families, was moving very slowly to avoid social unrest. The large SOEs were disengaged from ministries, which were organized as corporations, but their governance and regulation were weak. Commercial banks were increasingly exposed to defaults on loans by the SOEs, and without further reform, the growth and stability of the financial sector may continue to be exposed to nonperforming loans (Shan, 2003).

Government Policies and Programs

The Government outlined its priorities, which included increasing rural incomes, creating jobs, developing the private

sector, strengthening the rule of law, and developing more mechanisms for citizen participation and financial and SOE reforms. The economic growth by itself will not be enough to achieve sustained socioeconomic progress in the future (China Economic News, 2004a).

During the National People's Congress (NPC) in March 2003, a new administration took office, and another round of restructuring of the administration was announced. The number of ministerial-level departments under the State Council will be reduced to 28 from 29. The State Development and Reform Commission (SDRC), which had been called the State Development Planning Commission (SDPC), was responsible for short- and long-term management of the economy. The Ministry of Foreign Trade and Economic Cooperation (MOFTEC), which was in charge of foreign trade, and the State Economic and Trade Commission (SETC) were abolished. The new Ministry of Commerce (MOC) took over domestic and foreign trade issues. The integration reduced obstacles and costs of foreign companies to enter the local markets and cut bureaucratic red tape and favored domestic producers in exporting their goods or importing raw materials to be used in production. The State Assets Supervision and Management Commission (SAMC) was established to absorb the relevant functions of the SETC. The CPC Central Committee Enterprise Commission and the Ministry of Finance will focus on the management of SOEs that are under the Central Government; these exclude financial institutions and other state assets, such as land, natural resources, and public service units. The establishment of the SAMC was expected to reduce the fragmentation of the SOE supervisory function split among various agencies, to avoid problems from policy conflicts and bureaucratic infighting, and to provide the base for separating the shareholding functions from the Government in the future by centralizing the functions in one agency. The State Family Planning Commission was renamed the State Population and Family Planning Commission. The China Banking Regulatory Commission (CBRC), which was in charge of supervising banks and some nonbanking financial institutions, and the People's Bank of China (Central Bank) remained in charge of monetary policy for the country. The State Administration of Work Safety will oversee mining and production safety. The Government also abolished the State Gold Bureau and transferred its functions to the SDRC and the China Gold Association (Hong Kong and Shanghai Banking Corp. Ltd., 2003a).

The Government set banking reform as one of its top priorities. One of the conditions of full World Trade Organization (WTO) membership was to allow foreign financial institutions to participate fully in the financial system by 2006. The domestic financial system must be strengthened before a flexible exchange rate and a capital account system can be adopted. In 1998, the Government injected about \$33 billion into financial institutions and transferred \$169 billion in bad assets from banks to asset management companies during 1999-

2000. The Government set up three phases for each bank—bailout, corporatization, and stock market listing. In 2003, the Government used \$45 billion of foreign reserves to recapitalize two state-owned banks and planned to use another \$50 billion of foreign reserves to clean up the balance sheets of the other two state-owned banks in 2004 (Citigroup Global Market Inc., 2004, p. 5; Far Eastern Economic Review, 2004; Gazette of the State Council of the People's Republic of China, 2004b; PricewaterhouseCoopers International Ltd., 2004).

During the NPC meeting, the Government recognized that in the next two decades, China would face a great challenge from other developing countries such as India, Indonesia, Thailand, and Vietnam, to increase market shares in European countries and the United States. Since the 1980s, China has provided cheap and low-skill labor. The Government would like to turn its focus on the training and recruiting of professionals and specialists in various fields, which would be essential for China's further progress toward modernization. The future development will focus on knowledge and capital-intensive industries. During the past several years, foreign companies established high-tech research and development centers in China, and thousands of highly educated professionals returned to China from Australia, Canada, the United States, and Western European countries. Thousands more were willing to return to China if the economic conditions improved (Hong Kong and Shanghai Banking Corp. Ltd., 2003b).

China's investments were being directed by local governments and financed by state-owned banks. Local governments had strong political incentives to boost local economies by supporting such new investments as infrastructure projects, property development, and new industrial zones. In 2003, the Ministry of Land and Resources (MLR) froze land supply for building villas, and the Central Bank raised the required reserves ratio on commercial banks to 7% from 6% in September and was expected to increase the ratio in 2004. The Government issued a circular to commercial banks to curb credit and expansion investment in projects related to the aluminum, cement, and iron and steel sectors. The State Council raised the lending criteria for aluminum, cement, real estate, and steel projects by requiring more equity investment. The minimum equity ratio for steel increased to 40% from 25%, and that for aluminum, cement, and real estate increased to 35% from 20%. Other sectors for which investment was restricted or prohibited were machinery, petrochemicals, pharmaceuticals, printing, and textiles. Rapid investments might cause another round of commercial banks' nonperforming loan problems and would pose a threat to China's financial stability. The CBRC would penalize those who did not follow the policies. The four largest wholly state-owned banks accounted for 80% of the lending. The massive investment may also lead to more duplicate investment. Only the Central Government could approve any investment project of more than \$6.0 million. The growth of the money supply, bank loans, and fixed asset investment declined in the last quarter of 2003. The Government also decided that the focus of public investment should be switched from production-related investment to education, health, science, and technology, and priority was given to rural areas rather than the coastal or urban areas (Asian Development Bank, 2004,

p. 41-49; Gazette of the State Council of the People's Republic of China, 2004a).

The Government urged the NPC to amend the mineral resources law in 2003; the law was enacted in 1986 and amended in 1996. The Government believed that the changes were necessary to attract foreign investment in mineral development and production in China. The proposed changes may redefine mineral rights. In the 1986 and 1996 versions, all minerals above and under the surface belonged to and were controlled by the State. In 2000, the State Council issued a decree to allow foreign investors to establish wholly owned mining companies to prospect for and to exploit minerals in China; owing to a lack of clarity in regulations and legal definitions, however, exploration companies were reluctant to invest large amounts in China. Under the current law, prospectors have mining rights, but the law does not explain clearly how such rights can be guaranteed. In addition, local governments have been known to charge higher taxes and fees for foreign companies to explore in their jurisdictions. In 2003, the MLR established a mineral-resources law consultation committee to seek recommendations from domestic and overseas mining law experts (China Metal Bulletin, 2003).

Production

China was one of leading countries in the production of aluminum, antimony, bismuth, cement, coal, copper, fluorspar, gold, graphite, iron and steel, lead, magnesium, molybdenum, phosphate rock, rare earths, silver, talc, tin, tungsten, and zinc. The output quantity of these commodities could have significant effects on the world markets. The growth of output was expected to continue, especially for aluminum, copper, and iron and steel.

During the past several years, aluminum metal output increased sharply. About 2.8 million metric tons per year (Mt/yr) of installed output capacity was added, and aluminum metal output capacity had expanded to more than 8.3 Mt/yr at yearend 2003. According to the companies' expansion and greenfield plans submitted to the Government for approval, China will have an aluminum production capacity of about 10 Mt/yr in 2005. With the rapid increase in aluminum production, the ability of domestic output of alumina producers to meet demand will be much more difficult. In 2003, China imported about 5.6 million metric tons (Mt) of alumina, which accounted for about 50% of the total demand. The strong demand for alumina by aluminum smelters affected domestic and international market prices of alumina. The sole metallurgical-grade alumina producer in China, Aluminum Corporation of China Co. Ltd. (Chalco), increased the price of alumina several times during the year. The alumina price was expected to increase in 2004. Chinese aluminum smelters also faced electricity price increases because of power shortages in many areas of the country. Owing to high alumina prices and the shortage of electricity, about 20 smelters were forced to shut down temporarily or to close down permanently during the year. To reduce production costs, aluminum smelters formed alliances with coal/power companies to ensure receipt of preferential electricity supplies and prices. Analysts anticipated that the power supply throughout

the country will tighten in 2004 and may affect aluminum production in the eastern and northwestern parts of China. In 2003, China used about 5 Mt of aluminum, and supply exceeded domestic demand. China was a net exporter of primary aluminum [492,647 metric tons (t)] (Alumina and Aluminum Monthly, 2004b).

Owing to economic expansion, the production and consumption of copper in China continued to increase. During the past 5 years, copper consumption in China increased by an average of more than 10% per year. Copper consumption increased because demand from the construction, electrical appliance, and power sectors increased. In 2003, China's copper consumption was estimated to be 3.0 Mt. As a result of increasing demand, copper prices at the Shanghai Metal Exchange rose from 16,785 yuan (\$2,030) per metric ton in January to 21,608 yuan (\$2,613) per ton in December. Per capita copper consumption remained low compared with other developed areas, such as Japan, the United States, and Western Europe; China's copper consumption, however, was expected to increase continuously in this decade. The output of domestic copper mines could meet only less than 45% the copper smelters' needs; therefore, China was required to import a large quantity of copper concentrates from, in order of quantity imported, Mongolia, Chile, Australia, and Peru. In 2003, China imported 3.16 Mt of copper scrap, 2.67 Mt of copper concentrates, and 1.36 Mt of refined copper. Refined copper was imported mainly from Chile, Japan, Kazakhstan, and Russia, and copper scrap was imported from Hong Kong (imported from other countries and re-exported to China), Japan, and the United States. Even though geologists have discovered several mid-sized copper deposits in the western part of the country, mine output was expected to remain at its 2003 level during this decade; consequently, the gap of supply and demand would become larger. In the future, China will overtake Japan as the leading copper concentrates importer in the world. If the supply of copper concentrates in the international market becomes tight, then some Chinese copper producers may be forced to shut down part of their operations. In December, China's six leading copper producers held a meeting in Shanghai and agreed to reduce production by from 10% to 15% for 2004. The reduction of output may not happen, however, because Jiangxi Copper Co. Ltd. and Jinchuan Group Ltd. expanded their copper output capacity in 2003; the reduction may be just for their production plans in 2004 and was not against their output in 2003. Because of the tightened supply of concentrates and scrap and lower treatment charge and refining charges (TC/RC) in 2004 compared with those of 2003, refined copper output was expected to increase to 1.95 Mt in 2004 (Copper and Nickel Monthly, 2004a).

Gold production continued to expand in 2003. Shandong Province was the leading gold-producing province in China followed by Henan, Shaanxi, Hebei, Fujian, and Liaoning Provinces. In the newly issued foreign investment guidelines, gold and other precious metals were moved to the category of "limited investment" from the category of "forbidden investment," which means that the Chinese gold sector was conditionally open to foreign investors. Because gold mining and processing in China used relatively low technology,

advanced technology and modern management were required to improve its productivity. Of the 4,000 t of gold resources, about one-fourth required advanced technology for processing. Because of the monopoly policy, many foreign investors hesitated to participate in the Chinese gold mining sector. China ranked as the third leading gold consumption country in the world behind India and the United States. Gold consumption was expected to increase when the Government removed trade restrictions (China Gold Association, 2004).

China's iron ore production posted a slight increase in 2003. Beginning on April 1, 2002, the resource compensation tax for state-owned iron ore producers was reduced to 5 yuan (\$0.60) per ton from 15 yuan (\$1.81) per ton. The lower compensation tax had been available to independent iron ore producers since 1995. The reduction of the resource compensation tax helped state-owned iron ore producers invest more funds in the technical renovation of their mines and search for more iron ore resources in their mining areas that led to expanded iron ore output during the past 2 years. Because of the upgrade of ore-dressing processes in many plants, the recovery rate of iron ore fines concentrate improved. State-owned mining companies were also more willing to develop new mines. Three new mines—Beiminghe in Hebei Province, Laixin in Shandong Province, and Tianhu in the Xinjiang Uygur Autonomous Region—were put into operation. The Government expected that an additional 30 Mt of iron ore output capacity would come onstream to replace some old mines to maintain the total iron ore output at the current (2003) level during the next several years. In recent years, China has become the driving force in the international iron ore market. The world's largest iron ore producers, such as Companhia Vale do Rio Doce (CVRD), Rio Tinto plc, and BHP Billiton Limited, increased their output to meet the global demand. Iron ore imports to China were expected to increase continuously during the next several years (China Metals, 2004g).

The production of lead and zinc continued to increase in 2003. The shortage of concentrates in China forced lead and zinc producers to increase their reliance on imported raw materials. Zinc producers, such as Huludao Zinc Smelting Co., Liuzhou Zinc Products Factory, and the Zhuzhou Smelter, expressed their concerns about the shortage of concentrates. Huludao closed its No. 3 plant in July 2001 and had not reopened it. Two zinc smelters in Yunnan were closed in early 2002. In 2003, China's zinc and lead concentrates imports increased to 745,580 t and 678,996 t, respectively. The Government continued its crackdown on illegal mining activities in the Guangxi Zhuang Autonomous Region and Yunnan Province, which led to reduced supplies of lead and zinc concentrates. Owing to increased domestic demand, the metal market prices trended upward in the second half of the year. Other local producers that owned mines, however, increased their output. In 2003, the output of lead and zinc concentrates increased because the Government approved the resumption of the mining operation in Nandan, Guangxi Zhuang Autonomous Region; flooding in 2001 had closed the operation. Apparent lead and zinc consumption in China grew continuously during the past decade except in 1997. Owing to an increase in domestic demand, lead exports declined. Because of the shortage of concentrates and low

TC/RC in the international market, some Chinese lead and zinc producers could face a very difficult decision on whether to operate at loss or to shut down their smelters in the near future. In 2003, China consumed about 2 Mt of zinc and 1.1 Mt of lead (Lead, Zinc and Tin Monthly, 2004b).

Trade

China's economic reform has been underway for more than 20 years. Beginning in the 21st century, China increased its integration with the international community, and the WTO accession in 2001 accelerated the significant reform trade programs already in place. Although some barriers remain, Western countries will find it easier to enter the Chinese market. China agreed to implement tariff cuts, two-thirds of which will be implemented by 2004, and the remainder, by 2006. Tariffs will decrease to an average 9.44% in 2006 from 24.6% in 1997. The automotive, chemical, gem and jewelry, information technology products, and medical equipment sectors will be significantly affected.

The Chinese Government took steps to implement many of its specific WTO commitments. The Government reviewed 2,500 trade-related laws and regulations for WTO consistency. About 830 of these laws and regulations were repealed, and 325 were amended. Similar reviews also were taking place at the local level. The changes made by China generally were consistent with international norms in most key areas. As part of the WTO accession agreement, China committed to provide full information on the pricing mechanisms of state trading enterprises and to ensure that its import-purchasing procedures were transparent and fully in compliance with WTO rules. China agreed to phase-in full trading rights for wholly Chinese-invested enterprises and foreign-invested enterprises and individuals within a 3-year period. A relatively small number of goods, such as crude and processed petroleum and chemical fertilizers, continued to be limited to state trading with regard to the right to export.

In 2003, the Government amended the Foreign Trade Law, which had been enacted in 1994. The proposed amendments explained the implication of trade promotion and how to implement the mechanism. After becoming a member of the WTO in 2001, the Government's function shifted from managing specific enterprise operations to ensuring fair and orderly competition and protecting domestic enterprises when they faced discrimination or injury in foreign trade. Intellectual property rights, state trade, and tariff quotas were incorporated into the new version of the Foreign Trade Law (Gazette of the State Council of the People's Republic of China, 2004c).

Commodity Review

Metals

Aluminum.—The Central Government was trying to apply strict controls over the expansion of the aluminum sector, but Provincial and local governments were trying to increase employment, to promote social stability, and to reduce social payments. The State Council issued a circular to inform local governments that the Central Government would not support

any new greenfield or expansion aluminum projects but would support only those projects that would replace obsolete Soderberg cells. Local governments were directed not to approve any greenfield projects without consulting the Central Government. Aluminum producers replaced most highly polluting tiny Soderberg cells with large prebaked cells. In 2003, China retired 1.04 Mt of aluminum output capacity with Soderberg cells (Alumina and Aluminum Monthly, 2004a).

Guangxi Guixi Huayin Aluminum Co. Ltd. (a joint venture among Chalco, Guangxi Investment Ltd., and Minmetals Nonferrous Metals Co. Ltd.) began to construct its 1.6-Mt/yr alumina refinery in Debao County of Bose (Baise) City, Guangxi Zhuang Autonomous Region. Initial output capacities were designed to produce 800,000 metric tons per year (t/yr) of alumina and 250,000 t/yr of aluminum in 2006. The total construction cost was estimated to be \$11.4 billion (Alumina and Aluminum Monthly, 2003d).

Yixiang Aluminum Co. (a subsidiary of Yima Coal (Group) Co.) completed construction of its 100,000-t/yr alumina refinery in Mainchi, Henan Province. The first-phase construction totalled \$60.5 million. The goal was to have a 600,000-t/yr-output-capacity alumina refinery by 2006; the total cost was estimated to be \$266 million (China Metals, 2004a).

Alcan Inc. of Canada signed an agreement with Qingtongxia Aluminum Co. to purchase a 50% stake in Qingtongxia's 150,000-t/yr aluminum smelter and formed a joint venture. The smelter used 200-kiloampere (kA) prebaked cells and cost \$209 million to construct in 2001. Alcan provided a \$30 million initial fund in July for the joint venture, and Qingtongxia used the fund for technical renovation of its two other smelters that used Soderberg cells. Ningxia Power Investment Co. Ltd. also had shares in the joint venture. The joint venture started to build a 250,000-t/yr aluminum smelter and a powerplant in Qingtongxia's Phase 4 expansion. The ultimate goal of the joint venture was to have a total output capacity 650,000 t/yr of aluminum (China Metals, 2003l).

Aluminum Corporation of China (Chinalco) (the parent company of Chalco) agreed to participate in Shanxi Jinbei Aluminum Co., which was a joint venture among the Shandong Luneng Group, Shanxi Nonferrous Metals Industry Co., and the Xinzhou City government. Jinbei planned to build a 1-Mt/yr refinery in Yuanping County, Xinzhou City, Shanxi Province. The first phase of construction was a 450,000-t/yr refinery that started in October; it was expected to be completed in 2006. The refinery will use the combination process to produce alumina. Phase 1 of construction cost was estimated to be \$360 million. The plan also included the construction of a 1.8-Mt/yr bauxite mine, a 300,000-t/yr aluminum smelter, and a 50,000-t/yr magnesium and alloy plant. The Yuanping area has a significant amount of bauxite reserves (217 Mt), and Shanxi Province is rich in coal reserves and accounts for one-fifth of the country's total coal output (China Metals, 2004e).

Chalco and the East Hope Group reached an agreement to form a joint venture to build a 1.05-Mt/yr alumina refinery in Henan Province. Chalco will take 30% equity in East Hope Sanmenxia Aluminum Co. Ltd., which was established by East Hope, Hunaghe Aluminum-Power Co. Ltd., and two U.S. companies, JD Metal Works Co. and Pioneer Global Investment

Co. Ltd. After Chalco acquires its shares, the shares in Huanghe will be reduced to 15% from 24%, and the shares of JD Metal and Pioneer Global will remain at 13% and 12%, respectively. East Hope planned to have first-phase construction completed in 2005; output capacity will be 700,000 t (China Metals, 2003b).

Lanzhou Aluminum Co. Ltd. and Pechiney SA of France (a subsidiary of Alcan) signed an agreement to establish Lanzhou Pechiney Project Consulting Co., in which Pechiney held a 51% interest and Lanzhou, a 49% interest. Lanzhou Aluminum Co. (Lanzhou) (the parent company of Lanzhou Aluminum Co. Ltd.) had a primary aluminum output capacity of 210,000 t/yr, of which 110,000 t/yr was Soderberg cells and 100,000 t/yr, 200-kA prebaked cells. In 2001, the Government approved Lanzhou's investment of \$240 million to add a 150,000-t/yr 220-kA prebaked cell potline to replace its 80,000-t/yr Soderberg cell potline initially, but Lanzhou decided to build a 230,000-t/yr 300-kA prebaked cell potline and to transform the 80,000-t/yr Soderberg cell potline into a 100,000-t/yr prebaked cell potline. Lanzhou also planned to build a 600-megawatt powerplant, a 1-Mt/yr alumina refinery, and a carbon anode plant. The total investment was estimated to be \$1.2 billion. The consulting company will acquire shares in Lanzhou's projects. Pechiney agreed to supply alumina to Lanzhou from its alumina refinery in Australia. Lanzhou planned to shut down all its Soderberg cell potlines, and Chalco planned to purchase 29% of Lanzhou's shares in 2004 (China Metals, 2003h).

After 2 years of construction, Liancheng Aluminum Co. Ltd. in Gansu Province completed its two 200-kA prebaked cell potlines, which had a total of 252 tanks and an output capacity of 135,000 t/yr in 2003; the total cost was \$133 million. Together with three Soderberg cell potlines, Liancheng's aluminum metal output capacity increased to 235,000 t/yr. According to the plan approved by the Government, the company would close three Soderberg cell potlines after the 200-kA prebaked cell potlines were built. The new potlines were equipped with environmentally friendly equipment, and the power consumption per metric ton of aluminum was lower than the old ones. In 2003, Liancheng Aluminum, Shaanxi Changxin International Trade Co., the Lianyungang Port Administration, and the Lianyungang Economic and Technology Development Zone signed a letter of intent to invest \$726 million jointly to build a 2.4-Mt/yr alumina refinery at Lianyungang, Jiangsu Province. Phase 1 of the plan was to build a 500,000-t/yr refinery. After completion of the first phase of construction, Liancheng and Shaanxi Changxin will invest \$300 million to build a 300,000-t/yr aluminum smelter near the refinery. About 60% of China's alumina imports went through Lianyungang Port each year (Alumina and Aluminum Monthly, 2003a, c).

China's first aluminum smelter Fushun Aluminum Plant completed Phase 2 of the renovation project in 2003. The smelter replaced its Soderberg cell potline with a 200-kA prebaked cell potline. The smelter had a total output capacity of 175,000 t/yr. The smelter planned to invest \$97 million to replace another 35,000-t/yr Soderberg cell potline with a prebaked cell potline. The SDRC approved the proposed renovation project. If completed, the smelter will have a total output capacity of 260,000 t/yr (Alumina and Aluminum Monthly, 2003b).

Antimony.—In 2003, China was the leading antimony producer in the world and accounted for more than 70% of the world total. The quantity of antimony output and exports from China affected the price of antimony in world markets. 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. Since the flooding in Nandan and the crackdown on illegal exports in 2001, the world market price of antimony increased to about \$2,850 per metric ton at yearend 2002 from \$1,100 per metric ton at yearend 2001. Because of slow economic growth in Japan, European countries, and the United States, international antimony prices were maintained in the range of \$2,000 to \$2,400 per ton throughout 2003. China's antimony metal production continued to decline in 2003 because the Government continued its tight control on antimony concentrates output in the Guangxi Zhuang Autonomous Region. Before 2001, mines in the Guangxi Zhuang Autonomous Region produced more than 50,000 t of antimony in concentrates; this total excluded production from illegal miners. Since then, mine output from the Guangxi Zhuang Autonomous Region decreased by more than 50%. In 2003, the Government approved the reopening of five mines in the Nandan area, and mine output from the Guangxi Zhuang Autonomous Region was expected to increase in 2004. During the past couple of years, Hunan Province replaced the Guangxi Zhuang Autonomous Region as the leading antimony-producing Province in China. Xikuangshan Twinkling Star Co. Ltd. (formerly the Xikuangshan Mine Bureau) was the leading antimony producer in Hunan Province. In 2003, China imported 22,000 t of antimony concentrates from Kazakhstan, Russia, and Tajikistan. During the past 3 years, the statistical data for antimony concentrates were questionable. Antimony output from mines was lower than that of antimony metal output. Coverage of shortage of antimony concentrates was assumed to come from the mine producers' stockpiles (Precious and Minor Metals Monthly, 2004g).

In October, the Government reduced the export rebate of antimony oxide and antimony scrap to 11% and 0%, respectively, from 13% for both in 2004. The export rebate of antimony metal remained at 13%. Owing to an increase in domestic demand, the Government reduced the export quota of antimony and its products to a total of 65,700 t in 2004 from 67,000 t in 2003. During the past several years, output and consumption of flame-retardant products increased, which led to the increased demand for antimony oxide in China. China consumed about 20,000 t/yr of antimony metal. Domestic consumption of antimony and its products was expected to increase during the next several years (Precious and Minor Metals Monthly, 2003b).

Cobalt.—The demand for cobalt in China had increased sharply during the past several years. China's largest cobalt producer, Jinchuan Nonferrous Metals Corp., planned to expand its refined cobalt output to 2,000 t in 2004 and started construction of an additional 2,000-t/yr cobalt-smelting facility in 2003. Jinchuan completed the construction of its 400-t/yr

highly purified electrolytic cobalt plant in 2003, and trial runs were scheduled to start at yearend 2003. During the past several years, several secondary cobalt smelters were being built in Shanghai and the Provinces of Hainan, Liaoning, and Zhejiang. Cobalt was recovered as byproduct from nickel and copper mines in the Provinces of Gansu, Hebei, Qinghai, Sichuan, and Xinjiang. In 2003, China imported 83,468 t of cobalt concentrates from the Republic of the Congo and Cuba. The consumption of cobalt was about 8,600 t of metal (Precious and Minor Metals Monthly, 2004a).

Copper.—In 2003, Glencore International AG stockpiled up to 30,000 t of copper concentrates in its warehouse in Nanjing, Jiangsu Province, and tried to sell them to smelters at a low TC/RC rate. Owing to the decline in availability of domestic concentrates, China's six largest copper producers (Baiyin Nonferrous Metals Co. Ltd., Daye Nonferrous Metals Co., Jiangxi Copper Company Limited, Luoyang Copper Processing Factory, Tongling Nonferrous Metals Co., and Yunnan Copper Co.) agreed to form an alliance to purchase copper concentrate on the international market. The alliance set up a coordination team in Shanghai to share trade information. These six copper producers accounted for about 75% of China's total copper concentrate imports (China Metals, 2003c).

At yearend 2003, the refined copper output capacity of the Guixi Smelter (a subsidiary of Jiangxi Copper) increased to 400,000 t/yr from 200,000 t/yr. With the installation of a 100,000-t/yr converter, 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. The company produced 343,000 t of copper in 2003 compared with 231,000 t in 2002. The company also upgraded the ore output capacity to 100,000 metric tons per day (t/d) at its Dexing Mine. The ore output capacity of its newly acquired Wushan Mine increased to 3,000 t/d. The expansion project at Fujiawu Mine was expected to be completed in April 2004 and will increase the dressing capacity to 15,000 t/d. The company produced about 50% of raw materials from its mines and sourced the remaining raw materials from domestic and international markets. The imbalance in the supply of and demand for copper in Chinese and overseas markets might have some impact on the company's metal production plan. The company also decided to expand its downstream production capacity. Construction of a 150,000-t/yr copper rod mill was completed in 2003. The company signed an agreement with Yates Foil Co. of the United States to invest \$70 million to build a 6,000-t/yr electrolytic copper foil mill in Nanchang, Jiangxi Province; the construction began in September and was scheduled to be completed within 18 months. The copper foil will be used mainly in printed circuit boards. The joint-venture equity was 60-40 between Jiangxi Copper and Yates (China Metals, 2003e).

Jiangxi Copper acquired a 40% share of Kangxi Copper Co. Ltd. in Xichang, Sichuan Province. Kangxi Copper had output capacity of 18,000 t/yr of copper anode, 20 t/yr of silver, and 100 kilograms per year (kg/yr) of gold. Jiangxi Copper planned to establish its exploration and production base in the Provinces of Sichuan and Yunnan, which have a high potential for mineral resources. Jiangxi Copper also acquired a 46% share of Diaquan Silver-Copper Mining Co. in Datong, Shanxi Province (Copper and Nickel Monthly, 2003b).

Shanghai Xinfengneng Industrial Co. Ltd. began the construction of its solvent extraction-electrowinning (SX-EW) project in Hami, Xinjiang Uygur Autonomous Region. In 2001, Xinfengneng acquired the exploration and mining rights for the Tuwu-Yandong copper deposit, which covers an area of 7.97 square kilometers (km²) in the Tianshan region. After 2 years of prospecting and planning, the company decided to build a hydrometallurgical plant at its No. 2 ore body at the Tuwu prospect, which had 100 Mt of ore reserves with an average grade of 0.65% copper. The company estimated that 6 Mt of copper was contained in the resources of the Tuwu-Yandong deposit. Construction of the plant would be carried out in three phases. The company planned to produce 6,000 t/yr of copper in 2004, 30,000 t/yr in 2006, and 50,000 t/yr in 2007. The total investment was estimated to be \$121 million. After the completion of Phase 1 of construction, Xinfengneng could overtake Zhongtiaoshan Nonferrous Metals Co., which produced 2,000 t/yr of copper from its SX-EW plant, to become the largest hydrometallurgical plant in China (Copper and Nickel Monthly, 2003a).

Baotou Huading Copper Development Co. Ltd. started construction of its copper smelter in Baotou, Nei Mongol Autonomous Region. The smelter was designed to produce 800,000 t/yr of sulfuric acid and 200,000 t/yr of blister copper. The construction plan was divided into three phases. In the first phase, which was scheduled to be completed in November 2004, the smelter would produce 115,000 t/yr of sulfuric acid and 30,000 t/yr of blister copper. The second phase will expand copper output capacity to 100,000 t/yr and sulfuric acid output capacity to 400,000 t/yr. The implementation of the construction plan will depend on the development of the Oyu Tolgoi (Turquoise Hill) copper deposit in Mongolia (Copper and Nickel Monthly, 2003c).

In July, China Nonferrous Engineering and Research Institute, China Nonferrous Metal Industry Construction Group Co. Ltd., and Ivanhoe Mine Ltd. of Canada signed a cooperation agreement to develop the Oyu Tolgoi copper deposit. The Chinese partners will perform premining prospecting in the area and may participate in mining and exporting copper concentrates to China (China Metals, 2003f).

Yunnan Copper Group Co. Ltd. planned to increase its output capacity to 350,000 t/yr of refined copper, 50,000 t/yr of electrolytic zinc, 400 t/yr of silver, and 5 t/yr of gold by 2005. The shortage of copper concentrates was expected to be a major obstacle for the expansion plan. The company had five copper mines (Dahongshan, Dayao, Dongchuan, Mouding, and Yimen) in Yunnan Province. Because of exhausted copper resources, Yunnan Copper closed down the Dongchuan and the Mouding Mines 3 years ago and planned to close down the Dayao and the Yimen Mines because of exhausted copper resources within the next 4 years. The Dahongshan Mine in Yimen, which was put into operation in July, was designed to produce 12,000 t/yr of copper in concentrates and 159,000 t/yr of iron ore. The expansion of the Lala Mine in Sichuan Province, which was owned by Yunnan Copper and others, was completed in September, and output capacity increased to 11,400 t/yr of copper in concentrates. To replace its exhausted mines, Yunnan Copper signed agreements with three local companies in Diqing,

Yunnan Province. The Pulong Mine had estimated resources of 2 Mt of contained copper. Yunnan Copper acquired major shares in Yunnan Diqing Nonferrous Metal Co. Ltd., and Diqing Investment Co., Yunnan Huaxi Mining Resource Co., and Yunnan Mining Resource Co. became minor shareholders in the Pulong Mine. Yunnan Copper also acquired the exploration license for the Yangla Mine from Yunnan Diqing Tibetan Prefecture. Yunnan Copper planned to invest \$362 million in developing the mineral resources in Diqing (China Metals, 2004h).

Tongling Nonferrous Metals Co. planned to invest \$1.54 billion to expand its copper cathode output capacity to 450,000 t/yr from 310,000 t/yr within the next 3 years. Its subsidiary Tongdu Copper Holding Co. Ltd. had two copper plants—Jinchang Smelter in Tongling, Anhui Province, and Zhangjiagang United Copper Co. in Zhangjiagang, Jiangsu Province. The two smelters had a total output capacity of 180,000 t/yr, and Tongling's joint-venture company Jinlong Smelter in Tongling had an output capacity of 130,000 t/yr (Copper and Nickel Monthly, 2004c).

Gold, Silver, and Platinum-Group Metals.—Before 2002, China's gold market was controlled by the Government, which required that all mined and smelted gold output be sold to the People's Bank of China (PBC) at a fixed price. In 2001, the Government decided to establish a gold exchange in Shanghai and began trial runs on November 28. On October 30, 2002, the Exchange was put into full operation. The Shanghai Gold Exchange's 108 members included producers/consumers, traders, and commercial banks; membership was not open to foreign-funded companies.

The Ministry of Finance and the State Administration of Taxation agreed that all gold bullion traded on the Shanghai Gold Exchange would be value-added tax (VAT) free if not delivered. A VAT would be applied on delivered gold bars, but dealers would be able to receive an immediate refund of the tax. The 17% VAT resulted in inactivity on the China Silver Exchange, which opened in 2000, and the Shanghai Diamond Exchange until the change in taxation policy in May 2002.

In August 2003, the Government allowed platinum trade at the Shanghai Gold Exchange. Zhongbo-Shijin Science and Trade Co. Ltd. was the sole authorized platinum importer in China. Platinum transactions on the Shanghai Gold Exchange were exempt from the 17% VAT. In 2003, China imported 8,102 t of platinum mainly from Russia and South Africa.

In 2003, the Government approved the Shanghai Gold Exchange to conduct settlement with "T+5" [a gold spot trade can be made within 5 working days] in 2004, which indicated that futures trades of gold may be introduced in the near future. The Bank of China, the China Construction Bank, and the Industrial and Commercial Bank of China were members of the Shanghai Gold Exchange, and the Government allowed them to import and export gold and to hedge on overseas gold exchanges. The PBC retreated from the gold market completely at yearend 2002 and became a monetary bank.

The Government also allowed foreign companies to participate in domestic gold jewelry production, under the condition that the companies purchase local raw materials, and to engage in investment, processing, wholesale, and retailing

in China. The Government hoped this new policy would encourage more foreign companies to set up joint ventures and would ease the short supply of gold for jewelry in China (Precious and Minor Metals Monthly, 2004e).

The production of silver was from silver mines and associated production of copper, gold, lead, and zinc mines. Associated mines accounted for 80% of total output. During the past several years, China's mined silver output increased to more than 2,400 t in 2003 from less than 1,000 t in the 1990s. China's major silver producers were the Baojiapuzi Mine in Liaoning Province, the Fankou and the Pangxidong Mines (Lianjing Mine) in Guangdong Province, the Fengning Niuquan Mine in Hebei Province, the Hujiajian Mine in Jiangxi Province, the Poshan Mine (Tongbai Mine) in Henan Province, the Jiawula and Chaganbulage Mines in the Nei Mongol Autonomous Region, the Yinkengshan Mine in Zhejiang Province, and the Yintongzi Mine (Shaanxi Mine) in Shaanxi Province. In 2003, China produced more than 3,500 t of silver from domestic and imported ores and consumed about 2,000 t of silver. China's silver production and consumption were expected to increase in the future. Electronics accounted for 45% of the total consumption followed by jewelry, 14%; photosensitive material, 13%; coins, 6%; and others, 22%. In 2003, China exported 2,891 t of unwrought silver, and the Government increased the silver export quota to 3,050 t in 2004. The Government authorized 29 silver producers and traders to export silver (China Precious Metals, 2003; China Metal Bulletin, 2004e; Precious and Minor Metals Monthly, 2004b).

Sino Gold Mining Ltd. of Australia, which was the only foreign gold producer, operated the Jianchaling Mine in Shaanxi Province. Sino Guizhou Jinfeng Mining Ltd. (a subsidiary of Sino Gold) continued its exploration at the Jinfeng gold prospect in Niluo village, which is located 34 kilometers (km) southeast of Mingu township, Zhefeng County, Qianxinan Prefecture, Guizhou Province. The deposit is located in a large region of gold mineralization known as the Golden Triangle. Drilling intersected substantial mineralization in the footwall and hangingwall of the main deposit. Based on drilling results, the company estimated the resource to be 14 Mt at 5.8 g/t at a cutoff grade of 2 g/t. The bankable feasibility study was scheduled to be completed in 2004. Sino Gold had an 85% interest in Jinfeng Sino Gold Ltd. and also owned 51% of the joint-venture company Sino Mining Jinkang Ltd., which held exploration rights over a 233-km² area in the north-central part of Sichuan Province; the joint-venture partner was the Deyang Geochemical Group (the subsidiary of the Sichuan Provincial Bureau of Geology and Mineral Resources). Sino Gold had the right to earn a 75% interest in the property and the exclusive rights on any discoveries within a further 2,778-km² area that surrounds the project with a minimum expenditure of \$300,000 during the first 18 months. Exploration work focused on the Bachelor, the Milk Wood, the Pine Forest, the Seven Tree, and the Tanglong prospects. The site was operated by a local exploration group. Sino Gold also signed an agreement to acquire an initial 80% interest and exploration license in the White Mountain (former Banmiaozhi) gold prospect in Jilin Province; the prospect is located 230 km southeast of Changchun. During previous exploration work, which included underground aditing and

surface trenching, a 28-m regional fault structure with 5.1 g/t gold had been discovered. Sino Gold also prepared to sign a letter of intent to explore in northern Shandong Province (Sino Gold Ltd., 2003).

The Yunnan Provincial Government approved the formation of the joint-venture Yunnan Jin-Chang-Jiang Mining Co. Ltd. by SKN Resources Ltd. of Canada and Kunming Gold Exploration Engineering Co. Ltd. (KGEE); the joint venture would explore the Tuobuka project. SKN held an 80% interest in the joint venture, and KGEE had a 20% interest by contributing the mineral rights and the exploration permit. The exploration permit covered a 24.62-km² area about 110 km north of Kunming, Yunnan Province. The exploration work included a detailed survey and sampling of the mining tunnels. The drilling program will be carried out in 2004 (SKN Resources Ltd., 2003).

Indium.—China was one of the major indium-producing countries in the world. Indium was recovered as byproduct of zinc operations. Electronics was the main consuming sector. In 2000, China produced about 200 t of indium. Since the Government cracked down on illegal mining in Nandan in 2001, the supply of indium-associated ore from the Guangxi area was reduced sharply, which forced Laibin Huaxi Indium and Zinc Smelter and the Zhuzhou Smelter to shut down part of their operations. In 2003, the Government allowed five mines in Nandan to resume operations; only two contained indium. Mengzi Mining and Metallurgy Co. Ltd. in Mengzi, Yunnan Province, submitted a feasibility study to recover indium from its Bainiuchang Mine and to build a 50-t/yr smelter for Government approval. The mine had 1,000 t of indium reserves (China Metal Bulletin, 2004a, b).

Iron and Steel.—The continuous expansion in the iron and steel sector was mainly generated by strong domestic demand. The demand for steel products from such sectors as automobile, infrastructure, real estate, and shipbuilding has increased rapidly during the past several years. Steel producers were not only expanding iron and steel output in their old facilities, but also building new plants in other locations. Coastal areas were target places for expansion because they have easy access to ore imports. Because of environmental concerns and the 2008 Beijing Olympic Games, the Central and Beijing Governments urged Shoudu Iron and Steel (Group) Co. (Shougang) to reduce its output capacity in Shijingshan, Beijing, and to move production facilities to Hebei Province. Shougang reduced its crude steel output capacity by 2 Mt/yr during the past 2 years and relocated its coking and sintering facilities to Qian'an, Hebei Province. The company planned to build a 4.5-Mt/yr steel production facility in Qian'an, and the first-phase construction of 2-Mt/yr steel output capacity was scheduled to be completed in mid-2004. Shougang also planned a greenfield iron and steel facility in Caofeidian, Hebei Province; its initial output capacity should be 5 Mt/yr. Caofeidian is located near Jingtang Port where the Government approved the construction of a 200,000-deadweight-ton iron ore berth. Shougang intended to shut down its crude steel production facility at Shijingshan by 2012 (China Metals, 2003g).

Several iron mines were either under construction or being expanded in 2003. Phase 2 of construction of the Dahongshan

Mine, which is located in Yuxi, Yunnan Province, was underway. The Kunming Steel Group planned to expand the iron-ore-dressing capacity of the mine to 4 Mt/yr from 500,000 t/yr. The Wuhan Iron and Steel Group proposed the expansion of the Jinshandian Mine mining and dressing capacities to 3 Mt/yr from 1.5 Mt/yr by 2006. Panzhihua Iron and Steel Co. began the construction of the Baima Mine in Baima, Sichuan Province. The first phase of construction was scheduled for completion in 2006. The designed mining and dressing capacity of the mine was 6.5 Mt/yr, and designed production of iron ore pellets was 2.34 Mt/yr. The construction of Shougang's Mengjiagou Mine in Qian'an was underway. After completion, the mine will have an output capacity of 6 Mt/yr of iron ore. Jiuquan Iron and Steel Co. planned to develop its Heigou Mine in the Jingtieshan iron deposit in Jingtieshan, Gansu Province. The first-phase mining and dressing capacity was 2 Mt/yr and was scheduled to be completed in 2006. The plan for the second phase will expand the mining and dressing capacity to 6 Mt/yr in 2010. Yingliu Mining Co. Ltd. planned to develop its Caolou Mine in Anhui Province. The designed mining capacity was 1.5 Mt/yr (China Metals, 2004g).

In 2003, the Government considered the iron and steel sector to be one of the "overheated sectors" and restricted output capacity expansion. Steel production was expected to reach 250 Mt in 2004. It appeared that the "macrocontrol" policies affected smaller and private steel producers. Large state-owned steel producers continued to expand, but small and private steel producers were forced to shut down their operations because of a credit crackdown, high raw material prices, and a shortage of power. Large state-owned steel producers were less affected by higher raw material prices and shortages of power because they had preferential power prices and long-term supplies of raw materials. Without approval from provincial bank officials, local commercial bank officials were not allowed to issue any loans. Local governments also were reluctant to help small and private steel producers obtain bank loans. The macrocontrol policies were part of the Government's strategy to promote higher value-added steel products. Each year, China imported large quantities of high-value-added steel products from Japan, the Republic of Korea, and Taiwan to meet its demand (China Metal Bulletin, 2004c).

Hangzhou Iron and Steel Co. Ltd. (the subsidiary of the Hangzhou Iron and Steel Group) planned to expand its steel output capacity to 4 Mt/yr by 2007 to meet local demand. In Zhejiang Province, steel consumption was about 10 Mt/yr, but Provincial steel producers produced about 3.2 Mt/yr, and the gap was met by shipments from other Provinces. During the past couple of years, the subsidiary invested \$60 million each year for technology renovations of its facility that produced value-added steel products. The Hangzhou Group planned to build a greenfield steel plant that would produce flat products in Ningbo, Zhejiang Province. The proposed plan was submitted to the Government for approval (China Metals, 2004f).

BHP Billiton Inc. and four Chinese steel producers, Maanshan Iron and Steel Co., Shagang Group, Tangshan Iron and Steel Co., and Wuhan Iron and Steel Group Co., signed an agreement to form the Wheelarra Joint Venture. The joint venture will

expand BHP Billiton's Jimblebar Mine, which is located near Newman, Western Australia. BHP Billiton had a 51% interest; the four Chinese steel producers each held a 10% interest, and two Japanese companies, Itochu Minerals Australia and Mitsui Corp., held 4.8% and 4.2%, respectively. The joint venture will supply 12 Mt/yr of iron ore for 25 years to Chinese steel producers. The average iron content of the ore was 61.5%. Tangshan and Wuhan will receive 3.5 Mt/yr each, and Maanshan and Shagang will get 2.5 Mt/yr each (China Metals, 2004b).

In June, Shaoguan Iron and Steel Co. completed its 19-month 2.37-Mt/yr expansion project. The company's total steel output capacity increased to 4 Mt/yr. Two 120-t converters, two 120-t vacuum degassing furnaces, two slab casters, and a five-strand billet caster were added to the facility. The company planned to phase out its four 15-t converters and 90-t electric arc furnace (China Metals, 2003i).

The Guangzhou Iron and Steel Group and JFE Steel of Japan agreed to establish the joint venture Guangzhou JFE Steel Sheet Co. Ltd. to build galvanizing lines in Nanshan, which is located 60 km south of Guangzhou, Guangdong Province. The sheet will be from 0.3 to 2.3 millimeters (mm) thick and from 800 to 1,700 mm wide and will be used for automobiles and home appliances. Construction of the plant was scheduled to begin in early 2004 and to be completed in 2005. The total investment was estimated to be \$160 million. Guangzhou planned to build a 10-Mt/yr iron and steel plant in Nanshan. In the Guangdong area, steel demand exceeded supply, and about 7 Mt/yr of steel products was imported from other provinces (China Metals, 2003d).

Lead and Zinc.—Jinshi Mining Co. Ltd. in Hunan Province signed an agreement with West Mining Co. Ltd. in Qinghai Province for a 50,000-t/yr zinc metal expansion project in the Ganheyuan Industry Park. Cost of the expansion project was estimated to be \$31.4 million. After completion of the expansion in 2004, the zinc smelter will have an output capacity of 80,000 t/yr. West Mining was the largest lead and zinc mining company in the western part of China and produced about 100,000 t of lead and zinc in concentrates (China Metals, 2003k).

The Lanping Mine was the largest lead and zinc mine in China. In the 1990s, China Nonferrous Metals Industry Corp. tried to develop it, but the company was unable to remove all illegal miners. Billiton Inc. signed an agreement with the Yunnan Provincial Government to develop the mine in the late 1990s. After more than a year of negotiation, Billiton decided not to pursue the project. Sino Mining also expressed an interest in developing the mine. In the early 2000s, Yunnan Lanping Nonferrous Metal Co. was established from the merger of four local dressing plants and smelters. Province-owned Yunnan Metallurgical Group Corp. held the majority share of the company. In 2003, with the approval of the Yunnan Government, Sichuan Hongda Group Co. from Sichuan Province invested \$36.2 million in Yunnan Lanping and renamed it Yunnan Jinding Zinc Co. Ltd. (Jinding). Sichuan Hongda held a 60% interest (Sichuan Hongda Chemical Co. Ltd., 51% and Sichuan Hongda (Group) Co. Ltd., 9%), and the remainder was held by Yunnan Metallurgical, the Lanping County Financial Bureau, Nujiang State Asset Management Co.

Ltd., and Yunnan Copper. Jinding planned to invest about \$363 million to develop the mine and to build a 200,000-t/yr smelter. Phase 1 of construction was scheduled to begin in 2003 and was expected to be completed in 2005. The initial design output capacity was 100,000 t/yr of zinc metal (Lead, Zinc, and Tin Monthly, 2003d).

Baiyin Nonferrous completed a technical renovation of its Northwest China Lead-Zinc Smelter in 2003. The arrester rate was improved to 99%, and the recovery rate of metal increased by 0.3%. The company produced 79,000 t of zinc and 11,000 t of lead, and the output was expected to increase to 140,000 t of zinc and 15,000 t of lead in 2004. Huludao Zinc Smelting Co. planned to restart its No. 3 zinc smelter, which had an output capacity of 130,000 t in 2004 (Lead, Zinc, and Tin Monthly, 2003a).

In December 2002, Shuikoushan Nonferrous Metals Co. Ltd. began construction of a 80,000-t/yr lead smelter. The \$41.1 million smelter was financed by bank loans (50%) on which the Government would pay the interest for the first 2 years and state bonds (20%). The smelter, which was scheduled to be completed by yearend 2004, would replace Shuikoushan's old 60,000-t/yr smelter. The new smelter was designed to recover 96% of the emission gases that would produce 80,000 t/yr of sulfuric acid. The old smelter was not equipped with a gas recovery system (China Metals, 2003j).

Magnesium.—China overtook the United States to become the leading magnesium-metal-producing country in the world. Its output accounted for more than 50% of the world total. China's primary magnesium metal was produced mainly by the silicothermic, or Pidgeon, process; dolomite and ferrosilicon are the raw materials used. The process was considered to be obsolete by Western standards.

During the past several years, China's magnesium sector changed dramatically. In the 1990s, plants that produced about 5,000 t/yr were considered to be large, and more than 400 magnesium producers had a total output capacity of more than 200,000 t/yr. Through merger and careful modifications, new plants were being built with less capital and increased output. About 150 magnesium producers had a total output capacity of about 600,000 t/yr at yearend 2003. Magnesium producers in Shanxi Province accounted for 76% of the total output capacity; Ningxia Province, 11%; Shaanxi Province, 4%; and others, 9%. The country consumed about 52,000 t of magnesium metal from such sectors as aluminum alloys, die-casting magnesium alloys, desulfurizing agents in steelmaking, rare-earth alloys, and reducing agents in metal production. Magnesium consumption was expected to increase to 100,000 t in 2010. During the past several years, magnesium exports from China increased sharply. In 2003, China exported more than 80% of its total output. The Government urged magnesium producers to develop more downstream magnesium products for such sectors as automobiles, aerospace, and electronics (Precious and Minor Metals Monthly, 2004f).

Yuxing Hongfu Magnesium Co. Ltd. and Hong Kong-based Xuxing Science and Technology Co. formed the joint venture Xixian Yuxing Hongfu Magnesium Industry Co. Ltd. to build a 50,000-t/yr magnesium plant in Xixian County, Shanxi Province. Phase 1 of construction of 10,000 t/yr was scheduled to be completed in October 2003; Phase 2 of construction of

20,000-t/yr was scheduled to be completed by August 2004; and the final 20,000 t/yr was planned to be finished in 2005. The joint venture planned to apply for a listing on the stock exchanges in Hong Kong and Shanghai. Yuxing Hongfu had a magnesium metal output capacity of 6,000 t/yr (Precious and Minor Metals Monthly, 2003c).

Molybdenum.—Luoyang Luanchuan Molybdenum Industry Group Co., Ltd. completed construction of its dressing plant in 2003. The \$1.1 million expansion project would increase the daily dressing capacity to 6,000 t from 1,500 t and was expected to increase molybdenum concentrates output capacity to 13,000 t/yr. The company had successfully developed a 0.61-mm granular molybdenum powder in 2003 (Precious and Minor Metals Monthly, 2003a).

Nickel.—Because demand exceeded supply in China, the domestic No. 1 refined nickel (99.90% Ni) price increased from 79,000 yuan (\$9,550) per metric ton in January to 150,000 yuan (\$18,140) per ton in December and was expected to continue to increase in 2004. In 2003, production of nickel concentrates and nickel metal increased compared with that of 2002 (table 1). China was a net importer of 57,063 t refined nickel. The consumption of nickel was estimated to be about 120,000 t. The stainless steel sector was the major consumer of nickel, which accounted for 45% of the total, followed by electroplating, 27%; battery production, 10%; and others, 18%. Because the price of nickel went up sharply in 2003, about 20% of electroplating plants closed down their operations, and many battery producers also operated at about 50% of their output capacity. The demand for nickel was expected to increase because the stainless steel producers planned to increase their production in 2004. Baoshan Iron and Steel Group Corp.'s (Baogang) Shanghai No. 5 Steel Plant put its 150,000-t stainless plant into operation at yearend. Taiyuan Iron and Steel Co. planned to increase its stainless steel output in 2004. Nickel consumption was expected to increase to 140,000 t in 2004. Nickel was imported mainly from Australia, Canada, and Russia. The state-owned Minmetals Group and Cubaniquel of Cuba signed a supply agreement to import nickel and cobalt from Cuba with a total value of \$34 million. China Metallurgical Construction Co. planned to invest \$6.5 million to develop the Ramu nickel mine in Papua New Guinea (China Metals, 2004d).

The largest nickel producer in China was Jinchuan Nonferrous Metals Corp., which planned to raise funds for its expansion projects through an initial public offer on the stock market either at the end of 2005 or in early 2006. Jinchuan intended to expand its output capacities of copper to 250,000 t; nickel, to 100,000 t; cobalt, to 4,000 t; and precious metals, to 4 t by 2006. An estimated \$725 million would be required for the expansion project. The company expanded its copper output capacity to 120,000 t at yearend 2003 and began constructing an additional 80,000 t/yr of copper cathode capacity in 2003. Jinchuan, Jinping Hengao Nonferrous Metals Co., and the Jinping Government signed a cooperation agreement for the development of the nonferrous metals resources in Jinping County, Yunnan Province. Under the terms of the agreement, Jinchuan would provide technical and financial assistance and manpower to explore and develop the copper, nickel, and precious-metals resources in the county. In return, Jinchuan

would have the right to purchase raw materials in the county at fair market prices. Jinping Hengao would supply Jinchuan with 1,200 t of nickel matte in 2004 and 2,000 t of nickel matte for the next 8 years. Jinping Hengao had a nickel matte output capacity of 1,500 t in 2003 and planned to expand it to 2,500 t in 2004. Jinchuan undertook mining expansion in Jinping, which was expected to take several years to complete. Jinchuan's mine production in Gansu Province could supply only concentrates that contained about 45,000 t of nickel and 30,000 t of copper, which forced the company to source nickel and copper concentrates from the Kalatongke Mine in the Xinjiang Uygur Autonomous Region and from Mongolia (Copper and Nickel Monthly, 2004b).

Baogang and Yunnan Kunneng Co. Ltd. signed an agreement of cooperation to develop a nickel mine in Yuanjiang County, Yunnan Province. Kunneng received a license to mine nickel in the county for 40 years and invested \$9.2 million to build a 1,000-t/yr pilot plant to process nickel. The company planned to build a 10,000-t/yr refined nickel plant within the next 5 years. The average mine ore grade was 1.2% nickel and contained a total reserve of 530,000 t of nickel. Baogang and its subsidiaries consumed about 20,000 t of nickel in their stainless steel operations, and the demand for nickel was expected to increase to 25,000 t in 2005 and 45,000 t in 2006. To secure the supply of nickel, Baogang and Jinchuan signed a strategic alliance agreement in 2003. Baogang agreed to subscribe shares when the Government approved Jinchuan's listing in the stock market, and Jinchuan agreed to supply 20,000 t of refined nickel to Baogang. Baogang and Jinchuan also agreed to invest jointly in overseas nickel projects (Copper and Nickel Monthly, 2004d).

Tin.—China was the leading tin-producing country in the world. Because of strong domestic and international demand, tin prices in both markets increased. Because the supply of concentrates increased, output of tin metal increased by about 20% in 2003 compared with that of 2002. China's unwrought tin exports, however, decreased slightly to 31,285 t, and tin alloy exports also decreased slightly to 9,896 t. Because of the recovery of the global economy, analysts predicted that tin metal prices would increase in 2004. Owing to the increase in domestic demand for refined tin, the volume of exports from China would continue to drop to less than 30,000 t in 2004. China's tin consumption increased to more than 50,000 t, of which tin solder accounted for 50%. Domestic tin consumption was expected to increase slowly but steadily during the next several years because of the expanded demand for tin from the electronics sector (Lead, Zinc, and Tin Monthly, 2004a).

As the result of a flooding incident in Nandan in 2001 and declining tin concentrates supplies in the Guangxi area, Huaxi (China Tin) Group Co. reduced its tin output to about 13,000 t in 2003. Since the Nandan flooding, the Government cracked down on most of the illegal mining activities in the Guangxi Zhuang Autonomous Region and the Provinces of Hunan and Yunnan. The supply of tin concentrates from these areas decreased in 2003. The Government of Lengshuijiang, Hunan Province, shut down the Huangmaojian, the Junwan, the Mengji, the Quanshan, the Tianbao, and the Xuetang Mines midyear. The local government also shut down illegal smelters in the area. Lengshuijiang was a major antimony- and tin-

producing area in Hunan Province. The shutdown of these small mines adversely affected the supply of antimony and tin. In 2003, China imported 2,739 t of tin concentrates. The Central Government allowed several mines in the Nandan area to resume operations, but not the tin mines. Analysts expected that the Government would issue the mining license to Gaofeng Mining Co. Ltd. (a subsidiary of Huaxi) for the No. 105 deposit in Nandan after technical renovation of the mine increased ore output capacity to 530,000 t/yr in 2004. Recently, geologists discovered a medium-sized tin deposit in Huichang, Jiangxi Province, which contains 214,000 t of contained tin resources (Lead, Zinc, and Tin Monthly, 2003b, c).

Titanium.—China's titanium sector developed quite rapidly during the past decade, and China may become a major titanium-oxide-producing country in the world. Production of titanium oxide was mainly from ilmenite in the Provinces of Guangdong, Guangxi, Hainan, Sichuan, and Yunnan. In Sichuan, titanium was recovered as a byproduct of ironmaking production; Panzhihua Iron and Steel (Group) Co. (Pangang) was the largest titanium oxide (47% to 48% content) slag producer. More than 60 titanium oxide pigment producers had a total output capacity of about 500,000 t throughout China; most of these producers were concentrated in the Provinces of Guangxi, Hunan, Jiangsu, and Sichuan. In China, titanium oxide was produced mainly from the sulfate process; about 20 producers had an output capacity of more than 12,000 t/yr. The largest titanium producer was Pangang, which had the capacity to produce 200,000 t of titanium concentrates and 60,000 t of titanium oxide pigment. Pangang's titanium oxide pigment was produced from its subsidiaries—Pangang Jinzhou Titanium Industry Co. Ltd., Pangang Titanium Co., and Shanxi Titanium White Co. Ltd. Pangang Jinzhou was the largest chloride process titanium oxide plant in China with an output capacity of 10,000 t/yr; the Central and the Provincial Governments approved an expansion of its output capacity to 30,000 t/yr. The Government approved Pangang's plan to invest \$41 million to build a 180,000-t/yr rutile-type titanium oxide slag production line in the Panzhihua Industrial Development Zone, Sichuan Province (TZ Minerals International Pty Ltd., 2003; China Chemical Reporter, 2004).

Tungsten.—China was the leading tungsten-producing country in the world, and its output accounted for more than 80% of the world total. How much the country produced, the demand, and the regulations enacted by the Government affected the volume of exports and influenced the prices in the international markets. During the past decade, the Government and the tungsten producers met yearly to find ways to maintain the tungsten market price and to control production. The Government forced major tungsten producers to reduce their output, closed down illegal mining, and set a tungsten export quota. It set the production quota at 43,380 t and the total tungsten export quota at 16,300 t (W content) for 2003; the export quota share of 118 tungsten mine producers was to be based on their output capacities. Producers were restricted to exporting only their own products, and traders were required to source tungsten products from authorized operating producers and miners. After the China Chamber of Commerce of Metals, Minerals, and Chemicals Importers and Exporters verified

contracts between producers and traders and the export prices, the MOFTEC issued an export license. Legal exporters reached a consensus on setting floor prices for major tungsten products. Despite these actions, the prices of tungsten could be held for only a short period in the international markets because of the surplus in the domestic market. In 2003, ammonium paratungstate, ferrotungsten, tungsten carbonate, and tungsten oxide were major exported products. The export of tungsten wire increased by twofold in 2003 compared with that of 2002. The consumption of tungsten increased to 14,500 t in 2003 from 7,800 t in 1999. As a measure to control exports, the Government awarded 13 enterprises tungsten export rights in 2003. In 2004, the export rebate of concentrates and scrap was scheduled to be reduced to zero, and except for tungsten powder, other tungsten products were scheduled to be reduced to 5%. Also, the tungsten export quota will be decreased to 16,000 t (W content). The MOC issued the first 2004 batch export quota for tungsten products—tungsten oxide, 7,006 t; ammonium paratungstate, 5,208 t; tungsten powder and its products, 1,743 t; and tungsten acid and tungstate, 755 t. The increase in domestic demand, the decrease in export rebate, and the reduced export quotas would have direct impacts on the supply of tungsten in the international market. The market prices of tungsten products in the world market were expected to increase (China Metal Bulletin, 2004d).

In December, two state-owned companies, Jiangxi Rare Earth and Rare Metals Tungsten Group Corp. (JRRTC) and Minmetals, agreed to form Jiangxi Tungsten Group Co. Ltd. in Nanchang. Minmetals had a 51% interest, and JRRTC had a 49% interest. Minmetals will play a significant role in the tungsten sector.

Minmetals also held a 30% share in Xiamen Tungsten Co. Ltd., which was listed on the Shanghai Exchange, and was negotiating to acquire the Nanchang Cemented Carbide Plant in Jiangxi Province. In 2003, Xiamen Tungsten acquired a 65% share in Xiamen Honglu Tungsten and Molybdenum Co., a 55.52% interest in Chengdu Hongbo Industry Co., and a 70.93% equity in Ganzhou Hongfei Tungsten and Molybdenum Co. from Xiamen Sanbong Tungsten and Molybdenum Co. With these acquisitions, Xiamen Tungsten became the largest smelting company in China with an output capacity of 10,000 t ammonium paratungstate and tungsten oxide and 5,000 t of tungsten powder and tungsten carbide powder (China Metals, 2004c).

Industrial Minerals

Cement.—China was the leading cement-producing country in the world, and its output accounted for more than 40% of the world's total. More than 7,000 cement producers were registered, but analysts estimated that the actual number might be closer to 9,000 because of the fragmentation of the sector and the small size of many plants. Only about 12 producers had output capacities of more than 1 Mt/yr. During the past several years, cement production grew at an average of about 10% per year. The cement sector may soon face excessive production, and the Government urged investors to analyze the cement sector carefully because supply and demand were

basically balanced. During the past couple of years, the Government ordered cement producers to close down plants that used obsolete technology. It encouraged cement producers to reshuffle the cement sector through mergers, regroupings, and takeovers, especially urging east coast producers to take over obsolete plants in the western area and to protect the environment in the west. All new cement plants must meet an output capacity of 2,000 t/d. In 2003, 1,044 cement projects were underway, and the total investment exceeded \$9.17 billion. Most of these projects were located on the east coast. The Government ordered commercial banks to restrict credit loans to cement projects (Building Materials Industry Information, 2003).

Rare Earths.—In October, Xi'an Maxon New Material Co. Ltd. was established by Xi'an Xijun New Material Co. Ltd. (51% share) and Korea Resources Corp. of the Republic of Korea (49%) in Xi'an, Shaanxi Province. The company will conduct rare-earth research and develop fluorescence powder and magnetic materials. Most of the finished products will be exported (Precious and Minor Metals Monthly, 2003d).

The State Council approved the restructuring of the domestic rare-earth sector and the establishment of two regional groups—China Northern Rare Earth Group Co. and China Southern Rare Earth Group Co. The northern group was formed by the Nei Mongol Rare Earth Group, Gansu Rare Earth Group Co., and rare-earth producers from the Provinces of Shandong and Sichuan. The southern group included rare-earth producers from Shanghai and the Provinces of Guangdong, Hunan, Jiangsu, and Jiangxi. The Government appointed Chinalco and Minmetals to be the major shareholders of the southern group; each had a 30% share (Precious and Minor Metals Monthly, 2004c).

Mineral Fuels

In the late 1990s, China experienced an electricity surplus in most parts of the country, but power shortages re-emerged in 2002, and 23 Provinces had severe shortages in 2003. Rationalized pricing in the coal and power sectors led to shortages of coal supplies to thermal powerplants. The shortage of power prompted the Government to adopt numerous measures to ensure energy supplies for economic growth in the near future. The Government accelerated the construction of generating powerplants and grids and improved distribution of power through the grids. It also planned to expand and accelerate investment in hydropower and nuclear power; the two sources accounted for only 8% of China's energy use. The Government planned to add an average of 10 billion watts (GW) of new hydropower capacity annually and to build 30 nuclear powerplants with a total output capacity of 30 GW by 2020. Phase 1 of construction of two 1-GW reactors was underway at the Sanmen Nuclear Power Plant in Zhejiang Province. A total of six 1-GW generating units will be built in Sanmen. By yearend 2003, the Government approved the construction of 26 powerplants with a total generating capacity of 11.4 GW. Another 92 projects were waiting to be approved by the Government. By 2005, China will have an installed power-generating capacity of 390 GW. The Government hoped that

the balance between supply and demand would be reached by 2006 (China Chemical News, 2004; Precious and Minor Metals Monthly, 2004d).

Coal.—Coal mine safety continued to be a major problem for the Chinese Government. 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. During the past several years, the Government intensified its efforts to enforce coal mine safety regulations by closing down thousands of coal mines for safety violations. Because of profit temptation, many coal mines restarted their operations after the inspection team left. As a result of several major coal mine accidents throughout the country in 2003, more than 6,000 miners died. More than 70% of the accidents and deaths was at county-level coal mines. County officials depended on tax revenues from coal mines to support the county. According to the State Administration of Work Safety, less than one-half of the 24,439 licensed coal mines met the mandatory safety standards in China. The Government assigned the safety inspectors, but the local governments provided the funding. The Government intended to map out 13 coal-producing areas in 2004, of which each would have an output capacity of 100 Mt/yr (Interfax Information Services, 2004).

In 2003, China's coal production reached a record high (table 1). Coal from China was a major force in the Asia coal market. Owing to the Government provision of export incentives, China's coal exports dramatically increased. Total coal exports increased to 94 Mt in 2003 from 32 Mt in 1998, and most of the increase was from steam coal particularly in the northern Asian market. China's coal exports to Japan, the Republic of Korea, and Taiwan increased sharply during the past several years. Coal from Australia and Indonesia to the northern Asian region declined because buyers from this area wanted to diversify their supply sources.

Coal production was expected to increase by more than 10% to about 1.9 billion metric tons (Gt), and domestic coal consumption would reach 1.8 Gt in 2004. Coal output from Shanxi Province accounted for more than 20% of the country's total coal output; the Province exported about 50% of its output to other Provinces and overseas markets. Powerplants and other coal consumers in Shanxi Province experienced shortages of coal. The country's railway system has been a bottleneck for the development of the coal sector because of a lack of shipping capacity. The Government approved the increase in the average price for steam coal of 12 yuan (\$1.45) (tax included) per metric ton in 2004 and approved an increase in the upload price for thermal powerplants of 0.7 fen (0.084 cent) per kilowatthour. Effective on January 1, 2004, the national railway would increase coal delivery cost by 0.25 fen (0.03 cent) per metric ton-kilometer. Domestic coal prices were expected to increase. Also effective on January 1, 2004, the export rebate on steam coal would be reduced to 11% from 13%, and that on coking coal and coke would decrease to 5% each from 13% and 15%, respectively (China Coal News, 2003).

Baosteel Co. Ltd. (a subsidiary of Baogang) and Pingdingshan Coal Group in Henan Province signed a coal purchase agreement in 2003. Baosteel received the first right to purchase

coal from Pingdingshan. Pingdingshan had a coal output capacity of 30 Mt/yr, and Baosteel consumed about 15 Mt/yr of coal. The two companies also agreed to form the joint-venture Pingbao Coal Co. to develop the Shoushan coal mine in Henan Province. The mine has coal reserves of 308 Mt, and the joint venture planned to construct a 2.4-Mt/yr coking coal plant. Pingdingshan held a 60% interest in the joint venture, and Baosteel had 40%. Baosteel and the Yongcheng Coal Group in Henan Province formed the joint-venture Zhenglong Coal Co. to develop a coal mine in Henan Province. These two joint ventures also established two companies, Baoding Power Co. and Baosheng Power Co., in Shanghai to penetrate the coal market on the east coast (China Metals, 2003a).

Oil and Natural Gas.—Because of the rapid economic growth in China, the demand for oil has increased sharply. China became more dependent on oil imports to balance supply and demand. In 2003, China's crude oil imports increased to more than 91 Mt and were expected to increase to 120 Mt in 2004. China will overtake Japan as the leading crude-oil-importing country in Asia soon (China Chemical News, 2004).

China's onshore natural gas resources are mainly in Sichuan Province. Offshore natural gas resources are in Dong Hai (East Sea) and Nan Hai (South Sea). Geologists expected that additional natural gas would be discovered in these areas in the future. The Government predicted that the annual demand for natural gas would reach 63 billion cubic meters in 2005, 97 billion cubic meters in 2010, and 142 billion cubic meters in 2020. Chongqing City and Sichuan Province, which hold most of China's natural gas reserves, produced more than 50% of the total. In 2003, a massive explosion in the Chuandongbei gasfield in Kai County of Chongqing City killed more than 200 people, hospitalized more than 1,000 people, and forced more than 60,000 residents in the explosion area to relocate. China National Petroleum Corp. was the proprietor and operator of the gasfield. Accidents in gasfields and oilfields were less common than in coal mines (Washington Post, The, 2003).

References Cited

- Alumina and Aluminum Monthly, 2003a, A 2.4mtpy alumina refinery to be built at Lianyungang: Alumina and Aluminum Monthly, September, p. 10.
- Alumina and Aluminum Monthly, 2003b, Fushun Al's upgrade project comes to an end: Alumina and Aluminum Monthly, November, p. 10.
- Alumina and Aluminum Monthly, 2003c, Newly built cells completely in operation at Lanzhou Liancheng Al: Alumina and Aluminum Monthly, November, p. 10.
- Alumina and Aluminum Monthly, 2003d, 1.6mtpy alumina project to be launched at Guangxi Debao, November, p. 9.
- Alumina and Aluminum Monthly, 2004a, Analysis on China's aluminum production in 2003: Alumina and Aluminum Monthly, February, p. 1.
- Alumina and Aluminum Monthly, 2004b, Review of 2003 China aluminum market and prospect for 2004: Alumina and Aluminum Monthly, February, p. 4.
- Asian Development Bank, 2004, Asian development outlook 2004: Manila, the Philippines, Asian Development Bank, 280 p.
- Building Materials Industry Information, 2003, The development of cement industry in China: Building Materials Industry Information, no. 10, p. 2.
- China Chemical News, 2004, 2004 China energy supply and demand remains tight: China Chemical News, May 17, p. A6.
- China Chemical Reporter, 2004, Present status of the titanium dioxide sector: China Chemical Reporter, v. 15, no. 9, p. 16.
- China Coal News, 2003, Needs to improve international market share: China Coal News, February 15, p. 3.
- China Economic News, 2004a, Economic and social development and on the 2004 draft plan for national economic and social development: China Economic News, No. 4 Supplement, p. 4.
- China Economic News, 2004b, Statistical communiqué of the People's Republic of China on national economic and social development in 2003: China Economic News, No. 3 Supplement, p. 2.
- China Gold Association, 2004, China's gold production in December 2003: Beijing, China, China Gold Association press release, 5 p.
- China Metal Bulletin, 2003, Mineral resources law committee established: China Metal Bulletin, no. 47, p. 1.
- China Metal Bulletin, 2004a, A indium smelter to be built in Yunnan: China Metal Bulletin, no. 17, p. 30.
- China Metal Bulletin, 2004b, Indium prices expects to increase: China Metal Bulletin, no. 16, p. 28.
- China Metal Bulletin, 2004c, Macro-control of land use and bank loans: China Metal Bulletin, no. 11, p. 1.
- China Metal Bulletin, 2004d, Tungsten market is quite active: China Metal Bulletin, no. 4, p. 49.
- China Metal Bulletin, 2004e, 2004 silver export companies: China Metal Bulletin, no. 1, p. 23.
- China Metals, 2003a, Baosteel enters alliance with coal suppliers: China Metals, v. 9, no. 196, p. 10.
- China Metals, 2003b, Chalco, East Hope join hands in alumina project: China Metals, v. 9, no. 195, p. 17.
- China Metals, 2003c, Copper smelters united in concentrate procurement: China Metals, v. 9, no. 194, p. 6.
- China Metals, 2003d, Guangzhou Steel joins hand with JFE: China Metals, v. 9, no. 191, p. 6.
- China Metals, 2003e, Guixi smelter completed phase-3 construction: China Metals, v. 9, no. 191, p. 7.
- China Metals, 2003f, Mongolia: China Metals, v. 9, no. 189, p. 14.
- China Metals, 2003g, New steel capacities go coastal: China Metals, v. 9, no. 193, p. 1.
- China Metals, 2003h, Pechiney's joint venture with Lanzhou Aluminum: China Metals, v. 9, no. 191, p. 10.
- China Metals, 2003i, Shaoguan Steel expands to 4 mtpa: China Metals, v. 9, no. 188, p. 4.
- China Metals, 2003j, Shuikoushan builds new smelter: China Metals, v. 9, no. 181, p. 12.
- China Metals, 2003k, Qinghai West Zinc expands smelting capacity to 80 ktpa: China Metals, v. 9, no. 191, p. 8.
- China Metals, 2003l, Qingtongxia Al's joint venture with Alcan: China Metals, v. 9, no. 193, p. 7.
- China Metals, 2004a, Another non-Chalco alumina refinery: China Metals, v. 10, no. 200, p. 15.
- China Metals, 2004b, BHPBilliton, 4 Chinese steel companies ink 12 mtpa IO deal: China Metals, v. 10, no. 201, p. 16.
- China Metals, 2004c, China's largest tungsten company set up: China Metals, v. 10, no. 197, p. 8.
- China Metals, 2004d, China's nickel consumption to grow at a slower pace in 2004: China Metals, v. 10, no. 203, p. 1.
- China Metals, 2004e, Chinalco participate in Shandong energy's alumina project: China Metals, v. 10, no. 201, p. 7.
- China Metals, 2004f, Hangzhou Steel aims at 4 mtpa by 2007: China Metals, v. 10, no. 201, p. 13.
- China Metals, 2004g, New iron ore mining/dressing projects in China: China Metals, v. 10, no. 197, p. 1.
- China Metals, 2004h, Yunnan Copper beefs up mining investment: China Metals, v. 10, no. 200, p. 12.
- China Precious Metals, 2003, Silver review: China Precious Metals, November, p. 11.
- Citigroup Global Market Inc., 2004, Asia Pacific Economics: Hong Kong, China, Citigroup Global Market Inc., February 13, 25 p.
- Copper and Nickel Monthly, 2003a, China's largest SX/EW Cu plant being built at Xinjiang Hami: Copper and Nickel Monthly, December, p. 9.
- Copper and Nickel Monthly, 2003b, Jiangxi Cu acquires 40% of Kangxi Cu for more raw materials: Copper and Nickel Monthly, November, p. 9.
- Copper and Nickel Monthly, 2003c, 300,000tpy Cu blister project launched in Baotou: Copper and Nickel Monthly, December, p. 8.
- Copper and Nickel Monthly, 2004a, China copper market commentary in 2003 and forecast for 2004: Copper and Nickel Monthly, February, p. 1.
- Copper and Nickel Monthly, 2004b, Jinchuan Group Ltd.: Copper and Nickel Monthly, February, p. 12.

- Copper and Nickel Monthly, 2004c, Tongling to life Cu capacity to 450,000tpy within 3 years: Copper and Nickel Monthly, May, p. 9.
- Copper and Nickel Monthly, 2004d, Yunnan Kunpeng and Baosteel join hands to build refined Ni plant: Copper and Nickel Monthly, February, p. 9.
- Far Eastern Economic Review, 2004, Banking—Wasteful transfusion: Far Eastern Economic Review, January 22, p. 26.
- Gazette of the State Council of the People's Republic of China, 2004a, Circular of the General Office of the State Council on transmitting and issuing several opinions of the national development and reform commission and other departments on curbing irrational investment in steel, electrolytic aluminium and cement industries: Gazette of the State Council of the People's Republic of China, no. 6, p. 4.
- Gazette of the State Council of the People's Republic of China, 2004b, Decision of the Standing Committee of the National People's Congress on amending the law of the People's Republic of China on the People's Bank of China on the People's Bank of China: Gazette of the State Council of the People's Republic of China, no. 7, p. 9.
- Gazette of the State Council of the People's Republic of China, 2004c, Foreign trade law of the People's Republic of China: Gazette of the State Council of the People's Republic of China, no. 17, p. 4.
- Hong Kong and Shanghai Banking Corp. Ltd., 2003a, China's National People's Congress 2003: Hong Kong, China, Hong Kong and Shanghai Banking Corp. Ltd., China Monthly Report, April, p. 1.
- Hong Kong and Shanghai Banking Corp. Ltd., 2003b, New government brings new emphases: Hong Kong, China, Hong Kong and Shanghai Banking Corp. Ltd., China Monthly Report, May, p. 11.
- Hong Kong and Shanghai Banking Corp. Ltd., 2004, Economic charts: Hong Kong, China, Hong Kong and Shanghai Banking Corp. Ltd. China Monthly Report, January, p. 33.
- Interfax Information Services, 2004, China energy report weekly—Half of China's registered coalmines fail to meet safety standards: Interfax Information Services, v. 3, issue 6, p. 7.
- Lead, Zinc, and Tin Monthly, 2003a, Baiyin: Lead, Zinc, and Tin Monthly, November, p. 11.
- Lead, Zinc, and Tin Monthly, 2003b, China Jiangxi discovers large tin mine: Lead, Zinc, and Tin Monthly, December, p. 7.
- Lead, Zinc, and Tin Monthly, 2003c, Chinese tin price surges on feed problems: Lead, Zinc, and Tin Monthly, July, p. 6.
- Lead, Zinc, and Tin Monthly, 2003d, Yunnan Jinding Zn Co. set up in Kunming: Lead, Zinc, and Tin Monthly, September, p. 5.
- Lead, Zinc, and Tin Monthly, 2004a, Analysis and prospect for tin market in 2003 and 2004: Lead, Zinc, and Tin Monthly, February, p. 7.
- Lead, Zinc, and Tin Monthly, 2004b, Pb and Zn prices stay steady internationally, soft domestically: Lead, Zinc, and Tin Monthly, February, p. 2.
- Precious and Minor Metals Monthly, 2003a, Luoyang Moly puts into stream its expansion project: Precious and Minor Metals Monthly, December, p. 6.
- Precious and Minor Metals Monthly, 2003b, MOFCOM releases Zn, Sb, Sn, W, and Ag export quota: Precious and Minor Metals Monthly, December, p. 1.
- Precious and Minor Metals Monthly, 2003c, Shanxi looks to build up a 50,000tpy Mg JV: Precious and Minor Metals Monthly, July, p. 11.
- Precious and Minor Metals Monthly, 2003d, Sino-Korean rare earth enterprise set up: Precious and Minor Metals Monthly, November, p. 14.
- Precious and Minor Metals Monthly, 2004a, Apparent consumption of refined cobalt up in 2003: Precious and Minor Metals Monthly, February, p. 16.
- Precious and Minor Metals Monthly, 2004b, China's annual silver report: Precious and Minor Metals Monthly, February, p. 3.
- Precious and Minor Metals Monthly, 2004c, Major rare earth conglomerate to be established: Precious and Minor Metals Monthly, February, p. 18.
- Precious and Minor Metals Monthly, 2004d, Power shortage may ease: Precious and Minor Metals Monthly, February, p. 2.
- Precious and Minor Metals Monthly, 2004e, Precious metals: Precious and Minor Metals Monthly, February, p. 2.
- Precious and Minor Metals Monthly, 2004f, Report of China's magnesium industry in 2003: Precious and Minor Metals Monthly, April, p. 8.
- Precious and Minor Metals Monthly, 2004g, Review for 2003 antimony industry and forecast for 2004: Precious and Minor Metals Monthly, February, p. 10.
- PricewaterhouseCoopers International Ltd., 2004, NPL Asia: Beijing, China, PricewaterhouseCoopers International Ltd., issue 4, 8 p.
- Shan, Weijian, 2003, Living on borrowed growth: The Wall Street Journal, October 7, p. A20.
- Sino Gold Ltd., 2003, Quarterly operation report: Sydney, Australia, Sino Gold Ltd. release report, December, 7 p.
- SKN Resources Ltd., 2003, SKN receives Chinese Government approval on Tuobuka gold project: Vancouver, British Columbia, Canada, SKN Resources Ltd. press release, October 2, 2 p.
- TZ Minerals International Pty Ltd., 2003, Inside China—Brief review of Chinese domestic ilmenite production: Perth, Australia, TZ Minerals International Pty Ltd., issue 2, p. 3.
- Washington Post, The, 2003, Nearly 200 dead in Chinese gas explosion: The Washington Post, December 26, p. A1.

Major Sources of Information

- China Coal Industry Association
21 Hepingli Bei Lu
Beijing 100713
- China Geological Survey
37 Guanyingyuan Xiqu
Xichang District
Beijing 100035
- China Iron and Steel Association
46 Dongsi Xi Dajie
Dongcheng District
Beijing 100711
- China National Offshore Oil Corp.
Jingwin Building 2a
Dongshanhuan Beilu
Beijing 100027
- China Nonferrous Metals Industry Association
12B Fuxing Lu
Xicheng
Beijing 100814
- China Non-metallic Minerals Industry Corp.
11, Sanliheliu
Haidian District
Beijing 100831
- China Petrochemical Corp.
A6, Huixin Dongjie
Chaoyang District
Beijing 100029
- Ministry of Commerce
2 Dongchang'anjie
Dongcheng District
Beijing 100731
- Ministry of Land and Resources
64 Funei Dajie
Beijing 100812
- Ministry of Science and Technology
15 Fuxinglu
Haidian District
Beijing 100862
- People's Bank of China
32 Chengfangjie
Xicheng District
Beijing 100800
- State Development and Reform Commission
38 Yuetannanjie
Xicheng District
Beijing 100824

State Environmental Protection Administration
115 Xinei Nanxiaojie
Xicheng District
Beijing 100035

State Statistical Bureau
75 Yuetannanjie
Sanlihe
Beijing 100826

The Power Corp.
137 Fuyoujie
Xicheng District
Beijing 100031

Major Publications

Almanac of China's Economy, annual.
China Coal Industry Yearbook, annual, Beijing, China.
China Chemical Industry Yearbook, annual, China
National Chemical Information Center, 53, Xiaoguanjie,
Andingmenwai, Beijing, 100029, China.
China Coal News, Beijing, China.
China Daily, 15 Huixin Dongjie, Chaoyang District, Beijing,
China.

China Gold News, Beijing, China.
China Metallurgical News, Beijing, China.
China Metals, China Features and Information Service, 57,
Xuanwumen Xidajie, P.O. Box 522, Beijing 100803, China.
China Nonferrous Metals News, Beijing, China.
China's Customs Statistics, Economic Information and Agency,
Hong Kong, 342 Hennessy Road 10/F, Wanchai, Hong Kong.
Economic Daily, Baizhifang, Xuanwuqu, Beijing, China.
Far Eastern Economic Review, 181 Gloucester Road, Hong
Kong.
Oil News, Beijing, China.
Statistical Yearbook of China, State Statistical Bureau, Beijing,
China.
The Yearbook of Iron and Steel Industry of China, annual,
Beijing, China.
The Yearbook of Land and Resources of China, annual, Beijing,
China.
The Yearbook of Mining of China, annual, Beijing, China.
The Yearbook of Nonferrous Metals Industry of China, annual,
Beijing, China.

TABLE 1
CHINA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES^{1,2}

(Metric tons unless otherwise specified)

Commodity ³	1999	2000	2001	2002	2003	
METALS						
Aluminum:						
Bauxite, gross weight	thousand tons	8,500	9,000	9,800	11,000	13,000
Alumina	do.	3,840	4,330	4,650	5,450	6,110
Metal, refined, primary and secondary	do.	2,810	2,990	3,570	4,510	5,970
Antimony:						
Mine, Sb content		89,600	110,000	140,000	100,000	100,000
Metal		84,500	106,000	148,000	124,000	90,000
Bismuth:						
Mine output, Bi content		2,680	1,120	1,250	950	1,000
Metal		860	770	1,230	700	800
Cadmium, smelter						
		2,150	2,370	2,510	2,440	2,500
Chromite, gross weight	thousand tons	220	208	182	180	200
Cobalt:						
Mine output, Co content		250	90	150	1,000	1,000
Metal		300	410	680	980	1,000
Copper:						
Mine output, Cu content		520,000	593,000	587,000	568,000	610,000
Metal:						
Smelter, primary		837,000	1,020,000	1,150,000	1,180,000	1,380,000
Refined						
Primary	thousand tons	836	1,020	1,220	1,300	1,420
Secondary	do.	344	350	300	350	430
Total	do.	1,180	1,370	1,520	1,650	1,850
Gold, mine output, Au content		173	180	185	192	205
Indium		200	200	150	120	100
Iron and steel:						
Iron ore, gross weight	thousand tons	237,000	223,000	220,000	231,000	261,000
Pig iron	do.	125,390 ⁴	131,010 ⁴	155,540 ⁴	170,850 ⁴	213,670 ⁴
Ferroalloys	do.	3,810	4,030	4,500	4,840	6,340
Steel, crude	do.	124,260 ⁴	128,500 ⁴	151,630 ⁴	182,370 ⁴	222,340 ⁴
Steel, rolled	do.	121,100 ⁴	131,460 ⁴	160,680 ⁴	192,520 ⁴	241,080 ⁴
Lead:						
Mine output, Pb content		549,000	660,000	676,000	641,000	955,000
Metal:						
Smelter, primary		597,000	830,000	840,000	916,000	1,250,000
Refined						
Primary		821,000	998,000	984,000	1,100,000	1,290,000
Secondary		97,000	102,000	211,000	230,000	290,000
Total		918,000	1,100,000	1,200,000	1,330,000	1,580,000
Magnesium metal, primary		120,000	190,000	200,000	230,000	342,000
Manganese:						
Ore, Mn content	thousand tons	640	700	860	900	920
Metal		100,000	120,000	150,000	190,000	320,000
Mercury, mine output, Hg content		200	200	190	495	610
Molybdenum, mine output, Mo content		29,700	28,800	28,200	29,300	31,000
Nickel:						
Mine output, Ni content		49,500	50,300	51,500	53,700 ^r	61,000
Matte		50,100	57,000	59,000	59,200 ^r	63,000
Smelter		44,400	50,900	49,500	52,400	64,700
Silicon, metal		395,000	480,000	500,000	580,000	680,000
Silver, mine output, Ag content		1,360	1,600	1,910	2,200 ^r	2,400
Tin:						
Mine output, Sn content		80,100	99,400	95,000	62,000	102,000
Metal		90,800	112,000	105,000	82,000	98,000

See footnotes at end of table.

TABLE 1--Continued
CHINA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES^{1,2}

(Metric tons unless otherwise specified)

Commodity ³	1999	2000	2001	2002	2003	
METALS--Continued						
Titanium:						
Ilmenite, TiO ₂ equivalent	90,000	125,000	150,000	375,000	400,000	
Sponge	1,660	1,900	2,470	3,650	4,120	
Tungsten, mine output, W content	31,100	37,000	38,500	49,500	50,000	
Vanadium, in vanadiferrous slag product	26,000	30,000	30,000	33,000	35,000	
Zinc:						
Mine output, Zn content	thousand tons	1,480	1,780	1,700	1,550	2,030
Refined, primary and secondary	do.	1,700	1,980	2,040	2,100	2,320
INDUSTRIAL MINERALS						
Asbestos	329,000	315,000	310,000	270,000	350,000	
Barite	thousand tons	2,800	3,500	3,600	3,100	3,500
Boron, mine, B ₂ O ₃ equivalent	110,000	145,000	150,000	145,000	130,000	
Bromine	42,000	42,000	40,000	42,000	42,000	
Cement, hydraulic	thousand tons	573,000 ⁴	597,000 ⁴	661,040 ⁴	725,000 ⁴	862,080 ⁴
Diatomite	340,000	350,000	350,000	370,000	380,000	
Dolomite	thousand tons	6,600	6,700	6,700	7,000	7,300
Fluorspar	do.	2,400	2,450	2,450	2,450	2,650
Graphite	300,000	430,000	450,000	629,000 ^r	710,000	
Gypsum	thousand tons	6,700	6,800	6,800	6,850	6,850
Kaolin	do.	1,500	2,700	2,500	3,000	3,100
Lithium minerals, all types	15,500	16,000	16,000	16,000	17,000	
Magnesite	thousand tons	2,450	4,070	3,580	3,700	3,700
Nitrogen, N content of ammonia	do.	28,300	27,700	28,200	30,300 ^r	31,500
Phosphate rock, P ₂ O ₅ equivalent	do.	6,000	5,820	6,300	6,900	7,550
Potash, marketable, potassium oxide equivalent	do.	260	380	385	450	500
Rare earths, rare-earth oxide equivalent	70,000	73,000	81,000	88,000	92,000	
Salt	thousand tons	28,124 ⁴	31,280 ⁴	34,105 ⁴	36,024 ⁴	34,377 ⁴
Sodium compounds: soda ash, natural and synthetic	do.	7,654 ⁴	8,342 ⁴	9,144 ⁴	10,330 ⁴	11,336 ⁴
Sulfur:						
Native	do.	280	290	290	290	290
Content of pyrite	do.	3,860	3,370	3,090	3,240	3,400
Byproduct, all sources	do.	1,630	1,900	2,000	2,200	2,400
Total	do.	5,770	5,560	5,380	5,730	6,090
Talc and related materials	do.	3,900	3,500	3,500	2,500 ^r	2,600
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Anthracite	do.	182,000	176,000	190,000	250,000 ^r	218,000
Bituminous	do.	822,000	781,000	965,000	1,110,000 ^r	1,470,000
Lignite	do.	45,600	42,000	47,800	53,000 ^r	52,000
Total	do.	1,050,000	999,000	1,200,000	1,410,000 ^r	1,740,000
Coke, all types	do.	121,100 ⁴	121,840 ⁴	131,310 ⁴	142,800 ⁴	138,800 ⁴
Gas, natural:						
Gross	billion cubic meters	25	27	30	33	35
Marketed	do.	20	22	24	26	28
Petroleum:						
Crude, including crude from oil shale	million 42-gallon barrels	1,190	1,200	1,210	1,240	1,260
Refinery products	do.	920	1,470	1,460	1,530	1,600

^rRevised.

¹Table includes data available through August 30, 2004.

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

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

⁴Reported by China's State Statistical Bureau.

TABLE 2
CHINA: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies ¹	Location of main facilities	Annual capacity ^c
Aluminum:			
Alumina	Pingguo Aluminum Co. (Aluminum Corporation of China)	Guangxi, Pingguo	850
Do.	Guizhou Aluminum Plant (Aluminum Corporation of China)	Guizhou, Guiyang	650
Do.	Zhengzhou Aluminum Plant (Aluminum Corporation of China)	Henan, Zhengzhou	1,300
Do.	Zhongzhou Aluminum Plant (Aluminum Corporation of China)	Hunan, Zhongzhou	1,100
Do.	Shandong Aluminum Plant (Aluminum Corporation of China)	Shandong, Zibo	950
Do.	Shanxi Aluminum Plant (Aluminum Corporation of China)	Shanxi, Hejin	1,400
Metal	Baiyin Aluminum Plant	Gansu, Baiyin	150
Do.	Lanzhou Aluminum Plant	Gansu, Lanzhou	210
Do.	Liancheng Aluminum Plant	do.	235
Do.	Pingguo Aluminum Co. (Aluminum Corporation of China)	Guangxi, Pingguo	380
Do.	Guizhou Aluminum Plant (Aluminum Corporation of China)	Guizhou, Guiyang	400
Do.	Jiaozuo Wanfang Aluminum Co. Ltd.	Henan, Jiaozuo	176
Do.	Henan Wanji Aluminum Co. Ltd.	Henan, Luoyang	180
Do.	Henan Huanghe Mianchi Aluminum Plant	Henan, Mianchi	115
Do.	Sanmenxia Tianyuan Aluminum Co. Ltd.	Henan, Sanmenxia	110
Do.	Shangqiu Aluminum Smelter	Henan, Shangqiu	115
Do.	Yichuan Yugang Longquan Aluminum Co.	Henan, Yichuan	200
Do.	Henan Shenhua Aluminum-Electricity Co. Ltd.	Henan, Yongcheng	200
Do.	Hanjiang Danjiangkou Aluminum Co. Ltd.	Hubei, Danjiangkou	73
Do.	Zhengzhou Aluminum Plant (Aluminum Corporation of China)	Hunan, Zhengzhou	60
Do.	Jilin Aluminum Co.	Jilin, Panzhi	70
Do.	Fushun Aluminum Plant	Liaoning, Fushun	175
Do.	Baotou Aluminum Plant	Nei Mongol, Baotou	216
Do.	Qingtongxia Aluminum Plant	Ningxia, Qingtongxia	240
Do.	Qinghai Aluminum Smelter (Aluminum Corporation of China)	Qinghai, Xining	255
Do.	Tongchuan Xingguang Aluminum Co. Ltd.	Shaanxi, Tongchuan	80
Do.	Huaxin Aluminum Industry Co.	Shandong, Chiping	160
Do.	Taishan Aluminum-Power Co. Ltd.	Shandong, Fecheng	125
Do.	Shandong Aluminum Plant (Aluminum Corporation of China)	Shandong, Zibo	55
Do.	Taiyuan Oriental Aluminum Co.	Shanxi, Taiyuan	75
Do.	Shanxi Guanlu Aluminum Co. Ltd.	Shanxi, Yuncheng	210
Do.	Yunnan Aluminum Plant	Yunnan, Kunming	130
Antimony	Huaxi (China Tin) Group Industrial Co.	Guangxi, Hechi	25
Do.	Xikuangshan Twinkling Star Co. Ltd.	Hunan, Lengshuijiang	37
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 Shaanx	40,000
Cobalt	tons Jinchuan Nonferrous Metals Corp.	Gansu, Jinchang	1,200

See footnotes at end of table.

TABLE 2--Continued
CHINA: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies ¹	Location of main facilities	Annual capacity ^c
Copper, refined		Jinchang Smelter (Tongling Nonferrous Metals Co.)	Anhui, Tongling	130
Do.		Jinlong Smelter (Tongling Nonferrous Metals Co.)	do.	120
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	120
Do.		Luoyang Copper Processing Factory	Henan, Luoyang	50
Do.		Daye Nonferrous Metals Co.	Hubei, Daye	150
Do.		Zhangjiagang United Copper Co. (Tongling Nonferrous Metals Co.)	Jiangsu, Zhangjiagang	100
Do.		Guixi Smelter (Jiangxi Copper Company Limited)	Jiangxi, Guixi	400
Do.		Huludao Copper Smelter (Huludao Zinc Smelting Co.)	Liaoning, Huludao	100
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 Copper Group Co. Ltd.)	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
Indium	metric tons	Laibin Smelter [Huaxi (China Tin) Group Co.]	Guangxi, Laibin	60
Do.	do.	Liuzhou Zinc Product Co.	Guangxi, Liuzhou	20
Do.	do.	Zhuzhou Smelter	Hunan, Zhuzhou	60
Do.	do.	Huludao Nonferrous Metals Group Co.	Liaoning, Huludao	30
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

See footnotes at end of table.

TABLE 2--Continued
CHINA: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies ¹	Location of main facilities	Annual capacity ^c
Iron and steel--Continued:			
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. (Taigang)	Hebei, Tangshan	2,300
Do.	Wuhan Iron and Steel (Group) Co. (Wugang)	Hubei, Wuhan	10,000
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, Panzhihua	3,000
Lead	Baiyin Nonferrous Metals Co. Ltd.	Gansu, Baiyin	50
Do.	Shaoguan Smelter	Guangdong, Shaoguan	100
Do.	Anyang Smelter (Yubei Metal Co.)	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 Nonferrous Metals Co. Ltd.	Hunan, Hengyang	80
Do.	Zhuzhou Smelter	Hunan, Zhuzhou	100
Do.	Kunming Smelter	Yunnan, Kunming	100
Lithium, LiCO ₃	Sichuan Shehong Lithium Co. Ltd.	Sichuan, Shehong	2
Do.	Xinjiang Lithium Co.	Xinjiang, Urumqi	5
Magnesium	Fushun Aluminum Plant	Liaoning, Fushun	5
Do.	Ningxia Huayuan Magnesium Group	Ningxia, Yinchuan	15
Do.	Huayu Interprises (Group) Ltd.	Shanxi, Jishan	35
Do.	Taiyuan Tongxiang Magnesium Metal Co. Ltd.	Shanxi, Taiyuan	42
Do.	Taiyuan Yiwei Magnesium Co. Ltd.	Do.	21
Do.	Wenxi Biyun Magnesium Co. Ltd.	Shanxi, Wenxi	30
Do.	Wenxi Yinguang Magnesium Group	Do.	40
Do.	Minhe Magnesium Plant	Qinghai, Minhe	7
Manganese, metal	Chongqing Tycoon Manganese Co. Ltd.	Chongqing	23
Do.	Guangxi Dameng Manganese Industry Co. Ltd.	Guangxi, Nanning	70
Molybdenum, concentrate	Luoyang Luanchuan Molybdenum Industry Group Co., Ltd.	Henan, Luanchuan	13
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	33,500
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
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

TABLE 2--Continued
CHINA: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies ¹	Location of main facilities	Annual capacity ^e
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 Co.]	Guangxi, Laibin	25
Do.	Pinggui Mining Bureau	Guangxi, Zhongshan	8
Do.	Yunnan Tin Industry Co.	Yunnan, Gejiu	55
Titanium, sponge	Zunyi Titanium Plant	Guizhou, Zunyi	6
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 (Baiyin Nonferrous Metals Co. Ltd.)	Gansu, Baiyin	150
Do.	Shaoquan Smelter	Guangdong, Shaoquan	170
Do.	Liuzhou Zinc Products Factory	Guangxi, Liuzhou	100
Do.	Shuikoushan Nonferrous Metals Co. Ltd.	Hunan, Hengyan	60
Do.	Zhuzhou Smelter	Hunan, Zhuzhou	300
Do.	Huludao Zinc Smelting Co.	Liaoning, Huludao	330
Do.	Laibin Smelter	Yunnan, Laibin	60

^eEstimated; estimated data are rounded to no more than three significant digits. NA Not available.

¹Companies are owned by either a State Government or a Provincial Government.

TABLE 3
CHINA: EXPORTS OF SELECTED MINERAL COMMODITIES IN 2003

(Metric tons)

	Quantity	Value (thousands)
METALS		
Aluminum:		
Alumina	60,000	\$21,330
Metal and alloys:		
Unwrought	1,249,249	1,792,572
Semimanufactures	273,293	667,740
Antimony metal, unwrought	25,243	55,913
Barium sulfate	2,170,000	67,443
Bismuth, includes powder, unwrought, and waste	4,626	25,782
Copper, metal and alloys:		
Unwrought	67,083	118,704
Semimanufactures	232,880	690,222
Iron and steel:		
Ferrosilicon	840,000	433,609
Pig iron and cast iron	710,000	125,604
Steel:		
Bars and rods	2,390,000	690,930
Shapes and sections	270,000	95,543
Sheets and plates	1,820,000	743,504
Tube and pipe	540,000	517,705
Lead:		
Metal, refined	679	253
Other	14,411	12,401
Magnesium metal, unwrought	151,162	230,854
Manganese, unwrought	165,458	161,777
Silicon metal	445,260	408,250
Tin, metal and alloys, unwrought	41,220	180,411
Tungsten, tungstates	8,548	41,733
Zinc:		
Metal and alloys, unwrought	484,231	396,580
Oxide and peroxide	96,960	65,607
INDUSTRIAL MINERALS		
Cement	5,330,000	171,578
Cerium oxide	9,290	16,649
Fluorspar	950,000	111,257
Granite	4,288,180	914,087
Graphite, natural	339,609	53,518
Magnesia, fused	392,736	110,202
Rare earths:		
Chorides	5,775	4,155
Oxides	5,833	56,775
Strontium carbonate	72,195	28,669
Talc	730,000	69,901
MINERAL FUELS		
Coal	93,880,000	2,750,324
Coke, semicoke	14,720,000	1,672,361
Petroleum:		
Crude oil	8,130,000	1,661,217
Refinery products	13,820,000	3,720,664

Source: General Administration of Customs of the People's Republic of China, 2003, China monthly exports and imports, no. 12.

TABLE 4
CHINA: IMPORTS OF SELECTED MINERAL COMMODITIES IN 2003

(Metric tons unless otherwise specified)

	Quantity	Value (thousands)	
METALS			
Aluminum:			
Alumina	5,610,000	\$1,375,761	
Metal and alloys, unwrought	880,735	1,227,101	
Semimanufactures	531,477	1,490,885	
Scrap	653,422	442,193	
Antimony:			
Antimony, crude	65	14	
Other	19,050	13,259	
Chromium, chromite	1,780,000	150,832	
Copper:			
Ore and concentrates	2,670,000	1,288,186	
Metal and alloys, unwrought	1,562,152	2,818,470	
Semimanufactures	1,055,765	2,783,388	
Scrap	3,161,784	1,332,272	
Iron and steel:			
Iron ore	148,130,000	4,856,502	
Steel:			
Bars and rods	1,220,000	645,824	
Scrap	9,290,000	1,405,292	
Seamless pipe	1,130,000	1,009,644	
Shapes and sections	860,000	296,983	
Sheets and plates	33,250,000	17,421,726	
Lead:			
Ore and concentrates	64,743	196,518	
Metal, refined	21,673	11,358	
Bars, rod, and wire	1,997	3,220	
Other	26,782	11,918	
Manganese ore	2,860,000	204,978	
Nickel:			
Ore and concentrates	8,405	4,702	
Matte	9,185	15,069	
Metal, unwrought	58,074	520,905	
Tin, ore and concentrates	2,200	3,550	
Titanium dioxide	228,533	393,100	
Zinc:			
Ore and concentrates	710,714	148,054	
Metal, refined	102,521	80,826	
Alloy	161,422	174,859	
Bar, rod, and wire	40,445	41,019	
INDUSTRIAL MINERALS			
Diamond	kilograms	12,738	1,242,019
Fertilizers:			
Compound fertilizers	4,990,000	900,007	
Diammonium phosphate	2,610,000	503,904	
Potassium chloride	6,230,000	739,418	
Potassium sulfate	330,000	56,555	
Urea	130,000	15,415	
Sodium carbonate	301,277	31,405	
MINERAL FUELS			
Coal	10,760,000	364,304	
Petroleum:			
Crude oil	91,120,000	19,808,734	
Refinery products	28,240,000	5,861,182	

Source: General Administration of Customs of the People's Republic of China, 2003, 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	890	1,200
Arsenic, As	910	1,900
Asbestos, mineral	39,000	55,000
Barite, ore	million tons	100
Bauxite	do.	720
Bentonite	do.	890
Bismuth, Bi	260	270
Boron, B ₂ O ₃	32,000	33,000
Cadmium, Cd	92	290
Chromite, ore	4,400	5,700
Coal	billion tons	330
Cobalt, Co	80	560
Copper, Cu	30,000	38,000
Diamond, mineral	kilograms	3,200
Diatomite, ore	100,000	310,000
Fluorite, CaF ₂	2,400	110,000
Gallium, Ga	tons	4,100
Gas, natural	billion cubic meters	2,000
Gold, Au	tons	1,200
Graphite, mineral	74,000	140,000
Gypsum, ore	million tons	4,900
Iodine, I	tons	31,000
Iron ore, ore	million tons	21,000
Kaolin	do.	550
Lead, Pb	12,000	25,000
Lithium, Li ₂ O	1,000	1,300
Magnesite, ore	million tons	1,400
Manganese, ore	do.	200
Mercury, Hg	21	61
Mirabilite, Na ₂ SO ₄	million tons	9,900
Molybdenum, Mo	3,300	6,600
Nickel, Ni	3,000	5,100
Petroleum	million tons	2,400
Phosphorus, ore	do.	4,000
Platinum-group metals, metal	tons	15
Potash, KCl	270,000	590,000
Pyrite, ore	million tons	2,100
Rare earths, rare-earth oxide	21,000	64,000
Salt, NaCl	billion tons	190
Silver, Ag	34	85
Strontium, mineral	1,000	3,800
Sulfur, natural, S	240	320,000
Talc, ore	95,000	150,000
Tantalum, Ta ₂ O ₅	31	61
Tin, Sn	1,600	3,100
Titanium, TiO ₂	million tons	210
Trona, mineral	75,000	103,000
Tungsten, WO ₃	2,900	5,280
Vanadium, V ₂ O ₅	13,000	22,000
Zinc, Zn	37,000	60,000

Source: China Statistical Yearbook 2004, p. 9.