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The Mineral Industry of India

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India has significant resources of metals and industrial minerals. It produces 89 minerals, including 72 industrial minerals, which include construction and related materials; 10 metals; and 7 mineral fuels and related materials. The country ranked 2d in world production of cement and chromite; 3d in coal and lignite; 4th in zinc; 5th in rutile; 6th in bauxite and alumina, manganese and zirconium; crude steel; 7th in lead; 8th in ilmenite; 9th in cadmium; 10th in magnesite; and 16th in phosphate rock (Bedinger, 2015a, b; Bray, 2015a, b; Corathers, 2015; Guberman, 2015; Jasinski, 2015; Ministry of Mines, 2014a, p. 11, 15; Ministry of Steel, 2014, p. 2; Papp, 2015; Tanner, 2015; Tata Steel Ltd., 2014, p. 73; Tolcin, 2015a, b; van Oss, 2015).

In 2013, India implemented changes to attract foreign ownership in the mining industry. Central Public Sector Enterprises allowed 49% foreign ownership of petroleum refineries without approval from the Foreign Investment Promotion Board. For exploration in oil and natural gas fields and related oil and natural gas infrastructure, 100% foreign ownership was allowed. Foreign direct investment (FDI) in India increased by 17% to $28.3 billion in 2013 compared with $24.2 billion in 2012. Of the total FDI, $10 billion was from the following five countries: Mauritius, $6.8 billion; Singapore, $1.2 billion; Netherlands, $1.1 billion; the United Kingdom, $611 million; and the United States, $323 million (U.S. Department of State, 2013, p. 15; Ministry of Petroleum and Natural Gas, 2014, p. 11; Times of India, The, 2014; United Nations Conference on Trade and Development, 2014, p. 302).

Minerals in the National Economy

In 2013, the real gross domestic product (GDP) increased by 5.0%, which was slightly lower than the 6.0% rate of increase in 2012; the nominal GDP in 2013 was $1.93 trillion. Mining and quarrying accounted for 2.1% of the GDP in 2013. Owing to a decrease in the production of mineral commodities, the total value of mineral production decreased by 9.3% in 2013. The decrease in mineral commodity production was related to a decrease in demand, the high cost of electricity and natural gas, a lack of labor, and seasonally heavy rains (Ministry of Mines, 2014a, p. 12, 18; World Bank, The, 2014).

In 2013, mineral fuels accounted for 68.5% of the total value of mineral production; metals, 16.4%; and industrial minerals, 15.1%. According to the Ministry of Mines, the estimated value of metals decreased by 7.3%; iron ore accounted for 76.2% of the total value; zinc, 5.5%; manganese, 2.9%; chromite, 5.6%; bauxite, 1.6%; copper, 1.5%; silver, 4.9%; gold, 1.1%; and lead and tin concentrates, the remaining 0.7%. The estimated value of industrial minerals produced in India in 2013 decreased by 14.1%; limestone accounted for 62% of the total value; phosphorite (phosphate rock), 11%; barite, 8%; dolomite, 3%; gypsum, 2.4%; garnet (abrasive), 2%; and ball clay, kaolin, talc (soapstone steatite), and silica sand, 1% each (Ministry of Mines, 2014a, p. 12, 18; World Bank, The, 2014).

Government Policies and Programs

India's steel policy (2005) was amended by the Government and implemented in 2013. The new steel policy allows private companies to invest in the iron and steel sector; previously, the iron and steel sector was on the list of industries reserved for the public sector only. The import of technology from abroad, which is permitted under the new steel policy, allows private companies to modernize and expand existing operations and to construct new, cost-effective greenfield plants (Corporate Catalyst India Pvt. Ltd., 2014, p. 2).

The Government increased the import tariffs on gold and silver jewelry to 15% in 2013 from 10% in 2012 to protect the interests of small artisans and the domestic industry. In 2013, the royalty rates for major minerals (excluding coal, lignite, and sand for stowing) were revised in the States of Chhattisgarh, Jharkhand, Karnataka, and Odisha. The royalties for iron ore increased to 15% from 10%; metallurgical bauxite, to 0.6% from 0.5%; lead, to 14.5% from 12.7%; and phosphate rock, to 12.5% from 11% (Hindu, The, 2013; Press Information Bureau, 2013; Mineweb, 2014).

The Government created several types of free trade zones—the Special Economic Zone (SEZ), the Export Processing Zone (EPZ), the Software Technology Park (STP), and the Export Oriented Unit (EOU)—to encourage the production of exports. The newest type of free trade zone, the National Industrial and Manufacturing Zone (NIMZ), was established in greenfield industrial townships. Companies that want to operate in an NIMZ are able to obtain Government approvals for all clearances through a single "window" (U.S. Department of State, 2013, p. 14, 15).

Production

In 2013, the production of pyroxenite decreased by 75%; selenite, 74%; cobalt (metal), 63%; agate, 60%; garnet, 50%; rare-earths (metals, monazite concentrate), 46%; felsite, 40%; phosphate rock, including apatite, 36%; lime (kankar), 34%; barite, 29%; asbestos, 26%; lime (shell) and kaolin (processed), 23% each; tin (metal), 21%; chalk, 20%; iron ore and iron ore (gross weight) and concentrates (Fe content), 19% each; gypsum, 18%; diaspore and lead (refined), 16% each; alumina, fireclay, and silica, 14% each; pyrophyllite, 12%; and direct-reduced iron, 10%. The production of ferronickel magnesium increased by 75%; diamond (gem), calcite, and kaolin (salable crude), 29% each; sillimanite, 20%; mica (scrap and waste), 19%; wollastonite, 18%; vermiculite, 15%; bauxite, 13%; ferromanganese, 11%; and zinc (metal, primary) 10%. Data on mineral production are in table 1.

Structure of the Mineral Industry

In 2013, the number of mines that reported production was 3,691 in 2013 compared with 3,603 (revised) in 2012. Of the 3,691 operating mines, 680 were located in the State of Andhra Pradesh, 488 in Rajasthan, 447 in Gujarat, 382 in Madhya Pradesh, 346 in Tamil Nadu, 283 in Jharkhand, 205 in Karnataka, 193 in Chhattisgarh, 184 in Odisha, 146 in Maharashtra, 125 in West Bengal, and 212 in the remaining States. The number of coal mines was 573; metal mines, 626; and industrial mineral mines, 2,262. The total employment in the mining industry was estimated to be 50 million in 2013 compared with 51 million in 2012; of that amount, 29% of the people were employed in the production of iron ore; 17%, limestone; 11%, manganese ore; 5%, bauxite; 4% each, chromite and lead and zinc; 3% each, dolomite, quartz, and steatite; 2% each, copper, gold, garnet (abrasive), kaolin, sillimanite, and silica sand; and 1% each, barite, chalk, feldspar, fireclay, laterite, magnesite, phosphorite, pyrophyllite, and quartzite (Indian Bureau of Mines, 2013m, p. xii; Ministry of Mines, 2014a, p. 12). Table 2 is a list of major mineral industry facilities.

Mineral Trade

The total value of exports decreased by 13% to $265 billion in 2013 from $305 billion in 2012. The total value of imports increased to $448 billion in 2013 from $447 billion in 2012. The total trade value of exports of ores and minerals decreased by 9% to $25.4 billion in 2013 from $27.9 billion in 2012. In 2013, the exports of alumina increased by 5% to 927,830 metric tons (t) from 886,412 t, and those of aluminum and alloys, including scrap, increased by 12% to 566,762 t from 507,010 t. Alumina was exported mainly to Bahrain (42%), Iran (30%), the United Arab Emirates (15%), and Georgia and Egypt (3% each). Aluminum and alloys, including scrap, were exported to the Republic of Korea (24%); Mexico (9%); the United States (8%); the United Arab Emirates, Nigeria, and Turkey (4% each); and Germany, Kenya, and Saudi Arabia (2% each). Exports of refined copper increased to 263,311 t in 2013 from 238,138 t in 2012. Copper ore and concentrate were exported mainly to Italy (67%) and the United States (20%), and refined copper, to China (88%). Exports of gold ore and concentrates decreased to 57 kilograms (kg) in 2013 from 82,031 kg in 2012 owing to high taxes on imports, which affected the reexports. All gold was exported to Belgium. Exports of refined lead decreased to 30,262 t in 2013 from 43,283 t in 2012, and exports of zinc ores and concentrates increased to 75,870 t in 2013 from 5,591 t in 2012. Lead was exported mainly to the Republic of Korea (53%), Saudi Arabia (17%), and Indonesia (5%), and zinc ore and concentrates were exported to China (72%) and the Republic of Korea. Iron and steel exports increased to 10.3 million metric tons (Mt) in 2013 from 9.2 Mt in 2012. Exports of iron and steel went to the United Arab Emirates and the United States (10% each), Nepal and Thailand (6% each), Saudi Arabia (5%), and Belgium (4%). Exports of cement decreased by 10% to 1.8 Mt in 2013 from 2 Mt in 2012. Cement was exported mainly to Sri Lanka (59%), Nepal (26%), and South Africa (2%). Coal (excluding lignite) exports increased by 46% to 2,950 t in 2013 from 2,025 t in 2012. Coal was exported mainly to Bangladesh (60%), Nepal (33%), and Bhutan (6%) (Arnold, 2013; Indian Bureau of Mines, 2013a, p. 9–10; 2013d, 7–8; 2013e, p. 34–35; 2013f, p. 20, 21; 2013i, p. 16–17; 2013j, p. 21–22; 2013k, p. 19–21; Ministry of Mines, 2014a, p. 183–186; Vedanta Resources plc, 2014, p. 19; United Nations Conference on Trade and Development, 2014, p. 9).

The total trade value of imports of ores and minerals increased by 19% to $18.1 billion in 2013 from $15.3 billion in 2012. In 2013, the imports of alumina increased by 103% to 1.1 Mt in 2013 from 548,891 t in 2012, and aluminum alloy (including scrap) increased by 22% to 1.3 Mt in 2013 from 1.1 Mt in 2012. Alumina was imported mainly from Australia (88%) and China (12%), and aluminum and alloys (including scrap) were imported from China (13%), the United Arab Emirates (12%), Saudi Arabia (7%), the United Kingdom (6%), and the United States (5%). Imports of copper ore and concentrate increased to 2.3 Mt in 2013 from 2.1 Mt, and imports of refined copper increased to 23,977 t in 2013 from 18,524 t in 2012. Copper ore and concentrate were imported from Chile (47%), Australia (20%), Indonesia (10%), and Brazil (6%), and refined copper was imported from Zambia (49%), Chile (9%), the Republic of the Congo [Congo (Brazzaville)] (8%), and the Democratic Republic of the Congo [Congo (Kinshasa)] (6%). Gold imports decreased by 9% to 1.0 million kg in 2013 from 1.1 million kg in 2012, and increased in value by 9% to $47 billion from $43 billion. Gold was imported from Switzerland (51%), the United Arab Emirates (18%), South Africa (8%), and the United States (7%). Imports of lead ore and concentrate increased to 56,049 t in 2013 from 30,282 t in 2012, and the imports of zinc ore and concentrate increased to 75,870 t in 2013 from 5,591 t in 2012 owing to the increase in domestic demand. Most lead imports came from Australia (50%), Mexico (26%), and Peru (8%), and most zinc imports came from Peru (53%), Australia (40%), Saudi Arabia (4%), and Greece (2%). Iron and steel imports increased to 19 Mt in 2013 from 17 Mt in 2012. Iron and steel were imported mainly from China (13%), the Republic of Korea (10%), Japan (9%), the United States and the United Kingdom (7% each), and South Africa and the United Arab Emirates (6% each). Cement imports increased by 17% to 1.2 Mt in 2013 from 1.0 Mt in 2012. The main suppliers of cement were Pakistan and Vietnam (34% each), Bangladesh (17%), and China (7%). Coal imports, excluding lignite, increased by 34% to 137,561 t in 2013 from 102,841 t in 2012. The main suppliers of coal in 2013 were Indonesia (58%), Australia (20%), and South Africa (13%) (Arnold, 2013; Indian Bureau of Mines, 2013a, p. 9, 10–11; 2013d, p. 7, 9; 2013e, p. 35–36; 2013f, p. 20, 23; 2013i, p. 16, 19–21; 2013j, p. 21, 24; 2013k, p. 19, 21, 23; Ministry of Mines, 2014a, p. 183–186; Vedanta Resources plc, 2014, p. 19; United Nations Conference on Trade and Development, 2014, p. 9).

Commodity Review

Metals

Bauxite and Alumina and Aluminum.—The year 2013 was challenging for the aluminum industry in India, owing to low prices for aluminum on the world market since 2009 (in June

2013 the price decreased to a low of $1,760 per metric ton), and increases in coal and natural gas prices. Alumina production decreased by 14% to 3.74 Mt in 2013 from 4.35 Mt in 2012. Four major alumina and aluminum producers in India were National Aluminium Co. Ltd. (NALCO), Hindalco Industries Ltd. (Hindalco), Bharat Aluminium Co. Ltd., and Vedanta Aluminium Ltd. (VAL) (Indian Bureau of Mines, 2013a, p. 2; Metal Bulletin, 2014, p. 12).

NALCO planned to increase the production capacity at its Angul aluminum smelter in the State of Odisha to 567,000 metric tons per year (t/yr) from 460,000 t/yr. The company also planned to increase its Damanjodi refinery capacity from 2.1 million metric tons per year (Mt/yr) to 2.3 Mt/yr by upgrading the fourth line. In 2013, NALCO acquired International Aluminium Products Ltd., a 50,000-t/yr export-oriented rolled-product unit, and started production of a new-rolled product, Chequer plate (National Aluminium Co. Ltd., 2015a–c).

Hindalco made significant progress on its greenfield projects—the Utkal alumina project and Aditya aluminum project in the State of Odisha, the Mahan aluminum project in the State of Madhya Pradesh, and the Jharkhand aluminum project in the State of Jharkhand. The Utkal project was operated by Utkal Alumina International Ltd. (UAIL), which was a wholly owned subsidiary of Hindalco. The Utkal refinery had a production capacity of 1.5 Mt/yr of alumina and a 90-megawatt (MW)-capacity captive co-generation powerplant. Reserves at the Baphimali bauxite mine were estimated to last for 25 years. The alumina refinery and powerplant were in the final stage of development, and trial production was expected to start in 2014. The alumina product from UAIL would be used at the Aditya and the Mahan smelters. The Aditya aluminum project was located at Lapanga, Sambalpu District, in the State of Odisha, and consisted of a smelter with the capacity to produce 360,000 t/yr of alumina and a powerplant. Production at the aluminum smelter was expected to start in 2014. The Mahan aluminum project was located at Bargawan in the State of Madhya Pradesh and consisted of a 360,000-t/yr-capacity smelter and a 900-MW captive powerplant. The production of alumina was expected to start in 2014 (Hindalco Industries Ltd., 2013, p. 4, 14–15; 2014b).

In 2013, Hindalco operated two aluminum smelters—the Renukoot smelter in the State of Uttar Pradesh and the Hirakud smelter in the State of Odisha. A third smelter owned by Hindalco at Alupuram, Kerala District, was closed. Hindalco continued to expand its major manufacturing facilities through brownfield projects at the Hirakud smelter and at alumina refineries at Belgaum and Muri. The Hirakud smelter upgraded its horizontal-stud Søderberg smelter (HSS) technology to modern, environmentally friendly pre-bake smelter technology in 2013 (the first smelter in India to have done so). Owing to the plant modernization, the capacity of the Hirakud smelter increased to 161,400 t/yr from 100,000 t/yr, and the capacity was expected to be increased further to 213,000 t/yr soon. The Muri alumina refinery was located on the bank of the Subarnarekha River in the village of Chhotamuri and experienced a water shortage. The refinery depended on the Subarnarekha River for its water supply and, owing to low rainfall during the summer season, the river's water level dropped and it became insufficient for withdrawal. The production capacity of the Muri refinery was 450,000 t/yr of alumina and hydrates. At the Belgaum alumina plant, which was located in the State of Karnataka, the production capacity was increased to 350,000 t/yr of alumina hydrates (Hindalco Industries Ltd., 2013, p. 4, 14–15; 2014a, b)

Bharat Aluminium Co. Ltd. (BALCO), which was 51% owned by Sesa Sterlite Ltd. and 49% by the Government, planned to modernize and expand the capacity of the Korba aluminum smelter in 2015 to 570,000 t/yr from 345,000 t/yr by adding a new 325,000-t/yr-capacity Korba-III smelter. The Korba-I, which had a capacity of 100,000 t/yr, was shut down (Sesa Sterlite Ltd., 2013).

Production of bauxite increased by 13% to 15.4 Mt in 2013 from 13.6 Mt in 2012. Bauxite was produced in the following States: Odisha, which accounted for 36% of total production; Gujarat, 20%; Jharkhand and Maharashtra, 13% each; Chhattisgarh, 12%; Madhya Pradesh, 5%; and Goa, Karnataka, and Tamil Nadu, the remaining 1%. Three major companies involved in the mining of bauxite were BALCO, Hindalco, and NALCO. In 2013, 152 bauxite mines operated in India compared with 172 in 2012 (Indian Bureau of Mines, 2013c, p. 2).

NALCO, which was the leading producer of bauxite in India in 2013, operated the Panchpatimali bauxite mine at Damanjodi, Koraput District, in the State of Odisha. The Panchpatimali was thought to be the eighth largest bauxite deposit in the world, and the mine had a production capacity of 6.3 Mt/yr. The Panchpatimali Mine contributed 35% of India's total bauxite production. NALCO used all the mined bauxite at its refineries (Indian Bureau of Mines, 2013c, p. 2; 2014, p. x; Ministry of Mines, 2014b, p. 3).

Chromium.—Almost all chromite production was in the States of Odisha and Karnataka in 2013, and Odisha was the major producing State. Chromite was produced by six companies—Balasore Alloys Ltd., Ferro Alloys Corporation Ltd. (FACOR), Indian Metals & Ferro Alloys Ltd. (IMFA), Orissa Mining Corp. Ltd. (OMC), Jindal Stainless Ltd. (JSL), and Tata Steel Ltd. (Tata Steel)—all located in the State of Odisha. Maysore Minerals Ltd., which was state owned, was the only chromite producer in the State of Karnataka. Tata Steel planned to increase its production capacity by 600,000 t/yr of ferrochrome by developing an underground mine at the Sukinda Mine, which is located in the State of Odisha. The mining license for the Sukinda Mine expired on January 12, 2013, and since the expiration, Tata Steel operated the mine with a deemed extension permit (meaning that the operation was permitted to operate at one-half of the capacity). IMFA stopped operations at the Mahagiri chromite mines in October 2013 because the company failed to meet certain conditions required by the Ministry of Environment and Forest. The mine was operated as an opencast and underground mine. In January 2013, IMFA re-commissioned the Nuasahi underground chromite mine following an order of the Orissa High Court (Balasore Alloys Ltd., 2013, p. 6–8; MoneyWorks4me, 2013; Ferro Alloys Corporation Ltd., 2014; p. x; Indian Metals & Ferro Alloys Ltd., 2014, p. 15; Ministry of Mines, 2014a, p. 19).

Copper.—Production of copper (mine output, Cu content) increased by 6% to 36,100 t in 2013 from 34,000 t in 2012.

Government-owned Hindustan Copper Ltd. (HCL) was the only producer of primary refined copper to use output from its mines and from imported copper concentrate. In 2013, HCL operated the Indian Copper Complex (ICC) in the State of Jharkhand, the Khetri Copper Complex (KCC) in the State of Rajasthan, the Malanjkhand copper project (MCP) at the Malanjkhand Copper Complex in the Balaghat District of the State of Madhya Pradesh, and the Taloja copper project (TCP) in the State of Maharashtra. HCL planned to increase Malanjkhand's production capacity to 5 Mt/yr from 3 Mt/yr of ore by developing an underground mine below the open pit mine. The KCC had four projects—the Chandmari, the Dariba, the Khetri, and the Kolihan—in the State of Rajasthan. In 2013, HCL's Khetri and Kolihan Mines planned to expand their total production capacity to 3.1 Mt/yr of ore from 1.0 Mt/yr by developing the Banwas deposit. The Surda Mine in the State of Jharkhand was expected to expand by increasing the depth of the mine and by increasing production capacity to 0.9 Mt/yr from 0.4 Mt/yr of ore. Development of the Banwas Mine in the State of Rajasthan started in May 2010 and was scheduled to be completed by 2015. In 2013, HCL decided to resume operations at its closed mines at Singhbhum (the Kendadih and the Rakha Mines), which had production capacities of 1.5 Mt/yr of ore and 0.21 Mt/yr of ore, respectively. Sterlite Industries Ltd. and Hindalco Industries Ltd. produced primary refined copper metal from imported copper concentrate (Indian Bureau of Mines, 2013f, p. 2, 12; Hindustan Copper Ltd., 2014, p. 15).

Gold.—In 2013, gold production decreased by 10% to 1,570 kg from 1,740 kg. The State of Karnataka remained the leading producer of gold in India and accounted for 99% of total production. The remaining production of gold was from the State of Jharkhand. Production of gold was reported by Hutti Gold Mine Ltd. (HGML) in the State of Karnataka and Manmohan Mineral Industries Pvt. Ltd. in the State of Jharkhand (Indian Bureau of Mines, 2013j, p. 2).

In 2013, HGML operated three gold mines (the Heera Buddini, the Hutti, and the Uti Mines in Raichur District in the State of Karnataka) and remained the leading producer of primary gold in India. The Uti Mine, which was an open pit mine at the northern part of the licensed area, had a production capacity of 25,960 t/yr of ore. A proposal to establish an open pit mine at the southern part of the licensed area was submitted to the government of Karnataka for approval. The exploratory development of underground mines was in progress at the Uti and the Hutti Mines. Deccan Gold Mines Ltd. (DGML) conducted exploratory work in the Hutti-Maski Belt at various prospects, including the Hutti North and the Hirenagnur prospects, the southern and northern continuation of the Uti Mine lodes, and other prospects. DGML created a joint venture with JB Group to evaluate the available data and select an area for exploration study (Indian Bureau of Mines, 2013i, p. 12).

In 2013, a three-member Expert Committee appointed by the Government held HGML responsible for arsenic in drinking water in four villages of northern Karnataka. The Expert Committee reported that millions of tons of tailings had been dumped in an open area that led to contamination of the groundwater. The report recommended that HGML supply villagers living near its manufacturing unit with clean drinking water. The Kunderkocha gold mine, which was operated by Mahmohan Mineral Industries Pvt. Ltd., was the only gold mine operating in East Singhbhum District in the State of Jharkhand in 2013 (Indian Bureau of Mines, 2013j, p. 2; New Indian Express, The, 2013).

In 2013, the Ministry of Mines decided to tender the state-owned Bharat Gold Mines Ltd. (BGML), which operated the Kolar Gold Field (KGF) in the State of Karnataka and the Bisanatham Mine and the Chigaragunta Mine in Chittoor District and the Ramagiri Mine in Anantapur District in the State of Andhra Pradesh. In 2001, BGML abandoned some mining operations owing to high operational costs. Vedanta Resources plc of the United Kingdom planned to expand its production and considered bidding for BGML (Agrawal, 2013; Bhayani and Taneja, 2013; Singh, 2013).

In August 2013, Kolar Gold Ltd. of the United Kingdom announced that Jonnagiri's mining license was awarded to its partner Geomysore Services India (Pvt) Ltd. (GMSI). GMSI was a joint venture between Australian Indian Resources of Australia (80%) and Sun Mining and Exploration Ltd. (20%). The Jonnagiri project was located in the Kurnool District in the State of Andhra Pradesh and was divided into two blocks—the Dona East Block and the Dona Temple Block. The Joint Ore Reserves Committee-compliant estimate of the total resources of the project was 22,394 kg of gold. The open pit resources at the Dona East Block were estimated to have a grade of 2.1 grams per metric ton (g/t) gold and to contain 5,900 kg (reported as 190,000 troy ounces) of gold, and the underground resources were estimated to have a grade of 4.3 g/t gold and to contain 16,500 kg (reported as 530,000 troy ounces) of gold (Kolar Gold Ltd., 2013).

Iron Ore and Iron and Steel.—Iron ore production decreased to 117 Mt in 2013 from 144 Mt in 2012. The decrease in iron ore production was a consequence of the Supreme Court's ban on iron ore mining in 2011 and the lengthy process of renewing mining licenses. In 2011, the Supreme Court suspended iron ore mining activities in the States of Karnataka and Goa because of massive illegal mining activities that were causing environmental damage. In April 2013, the Supreme Court lifted the ban on 63 mines in the State of Karnataka. It allowed mining to resume at the mine in the State of Karnataka at a capacity of 2.3 Mt/yr; however, many iron ore mines were still closed because they could not meet environmental standards (Komnenic, 2013; Siddiqui, 2013; Ministry of Steel, 2014, p. 2; Sesa Sterlite Ltd., 2015).

The State of Odisha was the leading producer of iron ore and accounted for 47% of total iron ore production in 2013; Chhattisgarh, 21%; Jharkhand, 13%; Goa and Karnataka, 8% each; and Andhra Pradesh, 3%. In 2013, the five leading producers of iron ore were National Mineral Development Corp. Ltd. (NMDC), Steel Authority of India Ltd. (SAIL), Tata Steel Ltd., Rungta Mines Ltd., and Sarda Mines Pvt. Ltd.; together, these companies operated 22 mines (Indian Bureau of Mines, 2014, p. xii). SAIL (a state-owned company) operated five steel plants (the Bhilai steel plant in the State of Chhattisgarh, the Rourkela steel plant in the State of Odisha, the Durgapur steel plant in the State of West Bengal, the Bokaro steel plant

in the State of Jharkhand, the Indian Iron and Steel Company (IISCO) steel plant at Burnpur in the State of West Bengal), three alloy steel plants (the plant at Durgapur in the State of West Bengal, the Salem steel plant in the State of Tamil Nadu, the Visceswaraya iron and steel plant at Bhadravati in the State of Karnataka), and several Visakhapatnam (viz) units. In 2013, SAIL planned to increase the total production capacity at five of its steel plants to 26.2 Mt/yr from 14.6 Mt/yr combined. The modernization and capacity expansion plan included the commissioning of a new sinter plant at the Rourkela steel plant; an Air Separation Unit-4 and an Oxygen Plant-II at the Bhilai steel plant; and a raw material processing plant, sinter plant, coke oven battery-II, and wire-rod mill at the IISCO steel plant at Burnpur. In 2013, SAIL received "final forest clearance" approval for the Barsua and the Bolani iron ore mines and stage-1 forest clearance approval for the Gua iron ore mine. The company also received environmental clearance for capacity expansions at the Bolani and the Gua Mines (Indian Bureau of Mines, 2013k, p. 14, 15; Steel Authority of India Ltd., 2013, p. 2).

Rashtriya Ispat Nigam Limited (RINL) planned to increase production capacity to 6.3 Mt/yr from 3.0 Mt/yr at its Visakhapatnam steel plant (Vizag steel plant), which is located at Visakhapatnam in the State of Andhra Pradesh. In 2013, RINL signed a memorandum of understanding (MOU) with NMDC for the company to supply 10.5 Mt of iron ore through a pipeline from its Bailadila complex in the State of Chhattisgarh through Jagdalpur to Vizag Steel in the State of Andhra Pradesh. RINL also planned to obtain iron ore from its subsidiary Orissa Mineral Development Corp. Ltd. (Indian Bureau of Mines, 2013k, p. 15–16; Ministry of Steel, 2013, p. 8; Rashtriya Ispat Nigam Ltd., 2013, p. 25).

NMDC (a state-owned company) explored for minerals and developed mines to provide iron ore supplies for the steel industry. NMDC operated large iron ore mines at Bailadila in the State of Chhattisgarh and at Donimalai in the State of Karnataka. NMDC planned to diversify its resources and to set up an integrated steel plant with a production capacity of 3 Mt/yr of steel at Nagarnar in the State of Chhattisgarh. It also planned to expand its business by implementing greenfield and brownfield projects, which included construction of a 1.2-Mt/yr pellet plant at Donimalai in the State of Karnataka, a 360,000-t/yr banded hematite jasper ore beneficiation plant at Donimalai, a 2-Mt/yr pellet plant at Nagarnar, and a 2-Mt/yr beneficiation plant at Bacheli that would be connected by a slurry pipeline between Bacheli and Nagarnar in the State of Chhattisgarh. NMDC signed an MOU with Indian Railways for the Jagdalpur-Kirandul section of the Kottavalasa-Kirandul line of the East Coast Railway to deliver iron ore from Bailadila (Ministry of Steel, 2013, p. 8; 2014, p. 22, 23).

Lead and Zinc.—Hindustan Zinc Ltd. (HZL) produced primary lead and zinc and accounted for 96% of India's total production in 2013; Binani Zinc Ltd. produced the remaining 4%. HZL operated two hydrometallurgical zinc smelters with a total processing capacity of 210,000 t/yr of zinc and pyrometallurgical smelters with a processing capacity of 105,000 t/yr of zinc and 35,000 t/yr of lead. The Dariba smelting complex had a hydrometallurgical zinc smelter with a processing capacity of 210,000 t/yr of zinc and 100,000 t/yr of lead. In 2013, Binani Zinc Ltd., which was a subsidiary of Binani Industries Ltd. (89.9%), operated a smelter at Kochi in the Ernakulam District in the State of Kerala with a capacity of 38,000 t/yr of zinc metal (Hindustan Zinc Ltd., 2013, p. 21, 23).

The Tundo lead smelter was closed for economic reasons in 2013. The Rampura-Agucha Mine was operated as an opencast lead-zinc mine with a production capacity of 6.15 Mt/yr of ore. HZL planned to start production at its underground mine, which would have a production capacity of 3.75 Mt/yr of ore by 2014. HZL also operated three underground mines—the Rajpura Dariba Mine, the Zawar Mine, and the Sindesar Khurd Mine. The Rajpura Dariba Mine's production capacity was 0.90 Mt/yr of zinc ore, and HZL planned to increase its production capacity to 1.20 Mt/yr. HZL planned to increase production at the Sindesar Khurd Mine to 3.75 Mt/yr of silver ore from 2.0 Mt/yr by sinking a 1,050-meter (m) deep shaft. Since 2010, operations at three of the four mines at the Zawar complex were suspended as the company waited for forest clearance approval from the Ministry of Environmental, Forest and Climate Change. HZL planned to expand the mine's production capacity to 5.0 Mt/yr of lead ore during the next 6 years (Hindustan Zinc Ltd., 2013, p. 21, 23).

Manganese.—In 2013, despite heavy rains during the extended monsoon season in central India, production of manganese ore increased by 2% to 2.3 Mt from 2.2 Mt. In 2013, there were 165 manganese ore mines in India. MOIL Ltd. remained the leading producer of manganese ore, followed by Tata Steel, RBSSD&FN Das, M.L. Rungta, and S.R. Ferro Alloys (Indian Bureau of Mines, 2013m, p. 2).

MOIL planned to increase production at the mines in 2013. Production at the Balaghat Mine was expected to increase to 420,000 t/yr from 310,000 t/yr by deepening the Holmes shaft to 435 m from 300 m. The deepening of the Holmes shaft was expected to be completed by 2016. MOIL planned to increase production at the Ukwa Mine to 80,000 t/yr from 55,000 t/yr by 2021. The company planned to sink a 134-m vertical shaft; the project was expected to be completed by August 2014. Production at the Munsar Mine was expected to increase by sinking a 156-m vertical shaft in the central portion of the main ore body; the project was scheduled to be completed in May 2014 (MOIL Ltd., 2013, p. 11).

Industrial Minerals

Barite.—In 2013, owing to a decrease in the labor force and heavy rains, barite production decreased by 29% to 1.2 Mt from 1.7 Mt. Andhra Pradesh Mineral Development Corp. Ltd. was the only state-owned barite producer in India in 2013; it operated the Mangampeta barite project, which was located in the village of Mangampeta in Cuddapah District. The remaining resources at the Mangampeta barite deposits were estimated to be 64 Mt. Andhra Pradesh accounted for about 98% of India's total production of barite. The remaining 2% was produced at 11 private-sector mines (Indian Bureau of Mines, 2013b, p. 2; Indian Bureau of Mines, 2014, p. xiii).

Cement.—In 2013, India ranked second in the world in cement production after China. Cement production increased

by 4% to 280 Mt in 2013 from 270 Mt in 2012; however, some cement plants reported a loss owing to low demand for building materials and high energy and raw material costs. There were an estimated 112 cement plants with a total (combined) production capacity of 191.4 Mt/yr (tables 1, 2).

UltraTech Cement Ltd., which was India's leading producer of gray cement, white cement, and concrete mix, acquired the Gujarat Cement Unit of Jaypee Cement Corp. Ltd. (JCLL), a subsidiary of Jaiprakash Associates Ltd. In June 2013, the cement plant at Sewagram and the grinding unit at Wanakbori, which had a combined capacity of 4.8 Mt, became the company's 12th cement plant and grinding unit. UltraTech also acquired a 57-MW powerplant, a jetty for clinker, a desalinization plant, and a cement-bag manufacturing unit. The total capacity of UltraTech's cement plants increased to 62 Mt/yr in 2013. UltraTech submitted a letter of intent to the Infrastructure Development Department in the State of Karnataka for the construction of a new cement plant at Tuni in Dehradun District and at Someshwar in Almora District with production capacities of 3.5 Mt/yr and 2 Mt/yr, respectively (Global Cement, 2013h; Projects Today, 2013; UltraTech Cement Ltd., 2015).

In January, the operations at Ambuja Cements Ltd. were stopped because a fly ash container crashed into the mixing unit. Holcim India Ltd., which was a subsidiary of Holcim Group of Switzerland, planned to restructure Ambuja Cements Ltd. and ACC Ltd. by combining common functions across the two companies, while keeping the two brands independent. The restructuring was expected to save the company $14.4 million in supply chain and fixed-cost optimization. The integration process was expected to be completed by 2015 (Global Cement, 2013a).

Dalmia Bharat Cement planned to invest $335 million to increase capacity to 21 Mt/yr from 17 Mt/yr by the end of 2014. The company also planned to construct a greenfield unit with a capacity of 2.5 Mt/yr at Belgaum in the State of Karnataka. The estimated cost of the greenfield projects was $242 million. The cost of the two plant expansions in the northeast was estimated to be $93 million (Global Cement, 2013d).

In 2013, Heidelberg Cement India Ltd. completed and commissioned two projects in Damoh District in central India. Heidelberg Cement increased production at the Narsingarh plant in the State of Madhya Pradesh to 3 Mt/yr from 1.3 Mt/yr. Capacity at the Imlai plant was increased to 2 Mt/yr from 1 Mt/yr. In 2013, South India Cement Ltd. reopened a plant at Malkhed in Sedam Taluk in the Golbarga District in the State of Karnataka after upgrading it and increasing the capacity to 300,000 t/yr (Global Cement, 2013f, g).

In April, the JK Lakshmi Cement plant was set on fire by the residents of Malpuri Khurd in the Durg District. The villagers were on strike and demanded jobs at the cement plant in exchange for their farmland. The losses caused by the fire were estimated to be between $92 million and $128 million. In 2013, Birla Corp. Ltd. planned to increase its cement production capacity by 4.5 Mt/yr over 3 years by building two 1.5-Mt/yr-capacity plants at Chanderia in the State of Rajasthan and one 1.5-Mt/yr-capacity plant at Satna in the State of Madhya Pradesh. The company planned to invest approximately $416 million during 3 years. The total capacity of Birla Corp. was 9.3 Mt/yr (Global Cement, 2013c, e).

Birla Corp. was cited for failure to meet emission standards, inappropriate storage of limestone in open areas, an inadequate water sprinkler system, and other violations. The Andhra Pradesh Pollution Control Board ordered the closure of India Cements Ltd.'s plant at Yerraguntla and requested an investigation of the company's four cement plants in the Kadapa District owing to severe pollution in areas surrounding the plants (Global Cement, 2013b).

Clay and Shale.—Fireclay production decreased by 14% to 735,000 t in 2013 from 858,000 t in 2012. Owing to issues with environmental clearances and lack of a labor force, some fireclay mines shut down. In 2013, 69 fireclay mines reported production. The State of Rajasthan continued to be the leading producer of fireclay and accounted for 40% of total production in 2013; the other producing States were Tamil Nadu (18%), Jharkhand (14%), West Bengal (11%), Madhya Pradesh (6%), Gujarat (5%), Andhra Pradesh (3%), Karnataka (2%), and Maharashtra and Chhattisgarh, which provided the remainder (Indian Bureau of Mines, 2013j, p. 2; 2014, p. xiii).

Fluorspar.—Three companies—Maharashtra State Mining Corp. Ltd., Gujarat Mineral Development Corp. Ltd., and Rajasthan State Mines and Minerals Ltd.—produced fluorite in India in 2012, (the latest year for which comprehensive data were available). Owing to the high cost of land diversion required by the Forest Department, Rajasthan State Mines and Minerals Ltd. gave up three production licenses for the Karara, the Lakhawas-II, and the Tavidar fluorite mines in the State of Rajasthan, in 2012. In 2013, Rajasthan State Mines and Minerals operated the Karara, the Tavidar, and the Lakhawas-II fluorite mines using semimechanized opencast methods. Fluorite mines employed 81 people in 2012 compared with 113 people in 2011 (the latest year for which comprehensive data were available). Gujarat Mineral Development Corp. Ltd. operated Kadipani, which was the largest fluorspar project in the Vadodara District (formerly Baroda District). The mining was done by opencast method. Gujarat Mineral Development Corp. Ltd. (50%) in a joint venture with Swarnim Gujarat Fluorspar Pvt. Ltd. (50%) planned to construct a fluorite beneficiation plant with a capacity of 40,000 t/yr at Kadipani in the Vadodara District. In 2013, Maharashtra State Mining Corp. operated the Dongargaon fluorite mine in the Chandrapur District. The mine was operated manually (Rajasthan State Mines and Minerals Ltd., 2012, p. 5; Gujarat Mineral Development Corporation Ltd., 2013, p. 14, 30, 38; Indian Bureau of Mines, 2013i, p. 5).

Gypsum.—Production of gypsum decreased by 18% to 3.0 Mt in 2013 from 3.6 Mt in 2012. The State of Rajasthan was the major producer of gypsum in 2013. Thirty gypsum mines were operated by State-owned Rajasthan State Mines and Minerals and FCI Aravali Gypsum & Minerals India Ltd. (FAGMIL), which was formerly part of the Fertilizer Corporation of India Ltd. In 2013, FAGMIL obtained two new gypsum mining licenses for the Kishanpura A and the Kishanpura B properties, each of which had a capacity of 50,000 t/yr. Because the country's high-grade gypsum resources were gradually being depleted, and to increase production, FAGMIL applied to the Rajasthan State Government for

permission to enhance the capacity of the two mines in Padampura and Dhandra. The Padampura Mine is located in the Sri Ganganagar District and was a part of the Suratgarh group of mines. The lease area of the Padampura Mine was 120.0 hectares, and it had the capacity to produce 15,000 t/yr of gypsum. The Dhandra Mine is located in the Sri Ganganagar District in the State of Rajasthan, and it was a part of the Ramsinghpur group of mines. The lease area of the Dhandra Mine was 132.37 hectares, and it had the capacity to produce 35,000 t/yr of gypsum (FCI Aravali Gypsum and Minerals India Ltd., 2013, p. 5–6; 2015a, b; Indian Bureau of Mines, 2014, p. xiii).

Mineral Fuels and Related Materials

Coal.—Coal was the leading source of energy in India for manufacturing and for the production of bricks, cement, chemicals, fertilizer, steel, and textiles, and it was expected to remain important until 2032. In 2013, coal production increased by 2%. The demand for coal from the domestic market, especially power producers, was increasing; however, new coal projects were delayed owing to the long permitting process required by the Environment, Forest and Climate Change Ministry. Coal India Ltd. decided to invest in overseas assets to fill the demand gap. Chhattisgarh was the leading coal-producing State in the country; it accounted for 21.2% of total production, followed by Jharkhand, 20%; Odisha, 19.8%; Madhya Pradesh, 13.6%; Andhra Pradesh, 9.6%; Maharashtra, 7%; West Bengal, 4.8%; Uttar Pradesh, 2.9%; and Arunachal Pradesh, Assam, Jammu and Kashmir, and Meghalaya, 1.1% each. In 2013, 559 coal mines reported production in India, of which 176 were located in the State of Jharkhand; 101, in West Bengal; 71, in Madhya Pradesh; 60, in Chhattisgarh; 58, in Maharashtra; 50, in Andhra Pradesh; 28, in Odisha; and the remaining 15, in Arunachal Pradesh, Assam, Jammu and Kashmir, Meghalaya, and Uttar Pradesh (Eastern Coalfields Ltd., 2014, p. 50; Indian Bureau of Mines, 2013e, p. 2, 13–14).

In 2013, coal production was reported by eight state-owned companies—Bharat Coking Coal Ltd. (BCCL), Central Coalfields Ltd. (CCL), Eastern Coalfields Ltd. (ECL), Mahanadi Coalfields Ltd. (MCL), Northern Coalfields Ltd. (NCL), North-Eastern Coalfields Ltd. (NEC), South-Eastern Coalfields Ltd. (SECL), and Western Coalfields Ltd. (WCL), all of which were subsidiaries of Coal India Ltd. (CIL), as well as by Singareli Collieries Co. Ltd. (SCCL) (a joint venture between the Government of India, and the government of Andhra Pradesh), and the Neyveli Lignite Corp. (NLC), which produced lignite. In 2013, CIL approved two open pit mines for Southeast Coal Chhal-OC project, which had a production capacity of 6.0 Mt/yr. The company planned to increase the capacity at Kusmunda-OC to 50 Mt/yr from 15 Mt/yr. CIL operated four mines—the Ledo, the Tikak, the Tipong, and the Tirap Mines—at Makum Coalfields of Assam in the northeastern region. The Ledo, the Tikak, and the Tirap Mines were opencast projects, and the Tipong Mine was an underground mine (Indian Bureau of Mines, 2013e, p. 23; Ministry of Coal, 2014, p. 4, 5).

Natural Gas and Oil.—In 2013, India was the fourth-ranked consumer of oil and petroleum in the world after China, the United States, and Russia, and it was the fourth-ranked importer of crude oil and petroleum products. The demand for hydrocarbons and renewables was increasing in India owing to development and growth and a shift from coal to hydrocarbons and renewable sources of energy for homes and transportation. The country has a limited supply of domestic oil and natural gas, and it was forced to import more than 75% of its domestic consumption. Most of the imports came from the Middle East, and India was the second-ranked importer of oil from Iran. Owing to sanctions against Iran, India's oil imports from Iran decreased by more than 40% during the first 5 months of 2013. The U.S. Department of State announced in June 2013 that India's waiver was renewed, and India was allowed to continue importing crude oil from Iran; however, it would have to make an effort to substantially reduce its oil imports from Iran. India was actively searching for alternate sources of hydrocarbons to fuel its industries, and in June 2013, India's Minister of External Affairs visited Baghdad to discuss importing oil from Iraq. Iraq replaced Iran as the alternative supplier of crude oil to India, Saudi Arabia provided 20% of total crude oil imports, and Iraq provided 14%. Other suppliers of crude oil were Venezuela, 12%, and Oman, 9% (Oilprice.com, 2013; Thomson Reuters, 2013; Ministry of Petroleum and Natural Gas, 2014, p. 5; U.S. Energy Information Administration, 2014, p. 10).

State-owned companies Oil Natural Gas Corp. Ltd. (ONGC) and Oil India Ltd. (OIL) accounted for 68% of oil production and 73% of natural gas production. ONGC accounted for 59% of crude oil and 66% of natural gas production; OIL, 9% of crude oil and 7% of natural gas; and private joint-venture companies, 32% of oil and 26% of natural gas. Offshore crude oil production accounted for 48% of total production, and the remaining 52% of crude oil was produced in six States—Rajasthan (24.3%), Gujarat (13.4%), Assam (12.5%), Andhra Pradesh (0.8%), Tamil Nadu (0.6%), and Arunachal Pradesh (0.3%). The offshore natural gas production accounted for 75% of total natural gas production, and the remaining natural gas was produced in eight States—Assam (8.1%), Gujarat (4.7%), Tamil Nadu (3.7%), Andhra Pradesh (3.3%), Rajasthan (2.8%), Tripura (2.3%), West Bengal (0.4%), and Arunachal Pradesh (0.1%) (Ministry of Petroleum and Natural Gas, 2014, p. 18, 23–24).

Uranium.—In 2013, Uranium Corp. of India Ltd. operated seven mines in the State of Jharkhand at Bagjata, Bandduhurand, Bhatin, Jaduguda, Mahuldih, Narwapahar, and Turamdih. In 2013, Jaduguda had a production capacity of 300,000 t/yr of uranium. The Jaduguda Mine was the deepest underground mine in the country. The Bhatin Mine was undergoing improvements of layout and ore hosting arrangements. The applications for lease renewal for the Jaduguda and the Bhatin Mines were waiting for approval. The most modern underground mine was the Narwapahar Mine, which had a production capacity of 350,000 t/yr. The company planned to increase the Narwapahar Mine's production capacity to 525,000 t/yr. Turamdih, which was the second modernized underground mine, had a production capacity of 263,000 t/yr in 2013. The company planned to increase its capacity to 350,000 t/yr. The Banduhurang open pit mine had a production capacity of 1.2 Mt/yr of ore and faced many social, political,

and environmental problems, which caused frequent disruptions. The mine was producing at slightly more than 53% of its production capacity. The ore produced at the Bagjata Mine was used by the Jaduguda processing plant; however, political issues were affecting the transportation of the ore to the plant. The Mahuldih Mine was commissioned in March 2013, and the ore produced at the mine was used by the Turamdih plant (Uranium Corp. of India Ltd., 2014, p. 9–11).

New uranium deposits were discovered near Jharkhand's East Singhbhum District between the Jaduguda and the Narwapahar Mines in 2013. The new discovery was expected to expand the life of the country's first uranium mine in Jaduguda by 5 to 6 years (Seth, 2013).

Reserves and Resources

India's estimated share of world reserves of rutile was 16%; ilmenite, 12%; graphite, 10%; barite, 9%; zinc, 5%; and iron ore (crude) and zirconium, 4% each (table 3; Bedinger, 2015a, b; McRae, 2015; Olson, 2015; Tolcin, 2015; Tuck, 2015).

Outlook

The new Government intensified its efforts to increase the country's mineral production by implementing changes to its mineral policy and its import-export policy and by attracting foreign investment into its mineral industry. Given its efforts, India is likely to continue to be largely self-sufficient in the minerals and metals that constitute the primary raw materials for its various industries. In the next few years, the production of steel is expected to increase. Aluminum and alumina companies and cement plants are expected to continue increasing their production capacities. Newly discovered uranium deposits might help boost the country's economy. India, however, does not produce enough energy to support its economic growth and to meet the needs of households and transportation. The country is likely to seek to ensure continuous access to commercial energy at competitive prices by increasing domestic production of fossil fuels, coalbed methane, and shale gas (Ministry of Petroleum and Natural Gas, 2014, p. 5; Ministry of Steel, 2014, p. 4; U.S. Energy Information Administration, 2014, p. 1).

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TABLE 1
INDIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity[3]		2009	2010	2011	2012	2013
METALS						
Aluminum:[4]						
Alumina, Al_2O_3 equivalent	thousand metric tons	3,900	3,640	3,800	4,347 r	3,739
Bauxite, gross weight	do.	15,460 r	14,124 r	12,723 r	13,600 r	15,360
Metal, primary	do.	1,598	1,607	1,667	1,700	1,606
Cadmium metal		550	550	450	450	450
Chromium, chromite, gross weight[4]	thousand metric tons	2,588 r	4,101 r	3,274 r	2,943 r	2,950
Cobalt metal[4]		1,001	1,187	1,299	800	295
Copper:						
Mine output, Cu content[4]		29,500	35,500	37,700	34,000	36,100
Metal, primary:						
Smelter[4]		705,100	748,800	670,000	680,000	617,000
Refinery:[4]						
Electrolytic, cathode[4]		705,100	654,900	671,100	670,000	680,000
Fire refined		10,000	9,000	2,000	10,000	12,000
Total		715,000	664,000	673,000	680,000	692,000
Gold metal, smelter[4]	kilograms	2,173	2,320	2,245	1,740	1,570
Iron and steel:						
Iron ore and concentrate:						
Gross weight[4]	thousand metric tons	217,155	210,006	178,226	144,160	117,000
Fe content	do.	139,000	134,000	114,000	92,000	75,000
Metal:						
Pig iron[4]	do.	34,000	38,685	43,600	48,000	51,359
Direct-reduced[4]	do.	23,400	24,800	21,300	19,700	17,800
Ferroalloys:						
Ferrochromium, including charge chrome		873,385 4	850,000	891,000 r	1,001,582 r, 4	903,000
Ferrochromiumsilicon		10,000	10,000	11,000	11,000	11,000
Ferromanganese[4]		399,100	440,000	440,000	402,000 r	447,000
Ferronickel magnesium		88	96	107	110	200
Ferrosilicon		101,337 4	115,000 r	127,000 r	130,000 r	132,000
Silicomanganese[4]		875,500	1,000,000	1,433,600	1,522,600	1,418,844
Other		10,000	9,000	10,000	9,000	10,000
Steel:[4]						
Crude	thousand metric tons	63,500	69,000	73,500	77,300	81,300
Semimanufactures[5]	do.	50,000	51,000	53,000	52,000	53,000
Lead:						
Mine output, Pb content		62,000	70,000	84,000	100,000	105,000
Metal, refined:[4]						
Primary		58,000	62,000	92,000	122,000	44,000
Secondary		274,000	305,000	327,000	341,000	343,000
Total		332,000	367,000	419,000	463,000	387,000
Manganese:[4]						
Ore and concentrate, gross weight	thousand metric tons	2,374	2,858	2,542	2,225	2,264
Mn content	do.	845	1,013	895	800	850
Selenium	kilograms	15,000	15,000	16,000	16,000	16,000
Silver, smelter output[4]	do.	130,406	145,922	192,434	332,321	355,842
Tin, metal, smelter[4]	do.	59,206	60,236	51,735	48,023	38,082
Titanium mineral concentrates, gross weight:						
Ilmenite		675,000 r	729,000 r	550,000	340,000 r	340,000
Rutile		25,000 r	19,000 r	19,000 r	24,000 r	26,000
Zinc:[4]						
Mine output, concentrate:						
Gross weight		1,260,000	1,400,000	1,350,000	1,400,000	1,493,000
Zn content		695,000	740,000	796,000 r	758,000 r	763,707

See footnotes at end of table.

TABLE 1—Continued
INDIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity[3]		2009	2010	2011	2012	2013
METALS—Continued						
Zinc:[4]—Continued						
Metal:						
Primary		592,000	694,000	726,000	666,000	734,000
Secondary		44,000	52,000	54,000	49,000	54,000
Total		636,000	746,000	770,000	715,000	788,000
Zirconium concentrate, zircon, gross weight		32,000	27,800	39,000	40,000	40,000
INDUSTRIAL MINERALS						
Abrasives, natural, n.e.s.:[6]						
Diaspore		25,000	26,000	24,000	18,000	15,000
Garnet	thousand metric tons	1,500 r	2,000 r	1,800 r	1,400 r	700
Jasper		8,700	8,800	8,900	8,800	8,800
Asbestos		261	262	274	359 r	267
Barite	thousand metric tons	2,000 r	2,300 r	1,900 r	1,700 r	1,200
Bromine, elemental		1,500	1,600	1,600	1,700	1,700
Cement, hydraulic	thousand metric tons	205,000	220,000	240,000	270,000	280,000
Chalk		189,000 r	179,000 r	178,000 r	170,000 r	136,000
Clays:[7]						
Ball	thousand metric tons	949 r	1,000 r	1,500 r	1,800 r	1,900
Bentonite		671,000	561,000	739,000	996,000	1,100,000
Fire	thousand metric tons	540 r	780 r	950 r	900 r	740
Fuller's earth		29,000	5,600	5,600	5,600	5,600
Kaolin:						
Salable crude	thousand metric tons	2,500 r	2,700 r	2,900 r	3,400 r	4,400
Processed[4]	do.	84 r	78 r	76 r	101 r	78
Total	do.	2,590 r	2,780 r	2,980 r	3,500 r	4,480
Other	do.	85	90	90	90	90
Diamond:						
Gem	thousand carats	13 r	13	16 r	28 r	36
Industrial	do.	38	37	36	35	37
Total	do.	51 r	50	52 r	63 r	73
Dunite		66,500	35,700	35,000	75,000	70,000
Feldspar		523,000 r	503,000 r	763,000 r	1,200,000 r	1,200,000
Felsite		3,000	2,000	1,300	1,200	700
Fluorspar:						
Concentrates, metallurgical grade		8,786 [4]	8,400	8,500	8,600	8,800
Other fluorspar materials, acid grade		4,996 [4]	4,600	4,800	5,000	5,200
Gemstones, excluding diamond:						
Agate		--	20	400	500	200
Agate, including chalcedony pebble		160	150	150	140	140
Graphite[8]		123,000 r	118,000 r	144,000 r	140,000 r	143,000
Gypsum	thousand metric tons	3,500 r	4,500 r	5,200 r	3,600 r	3,000
Selenite		14,800	8,700	11,500	8,900	2,300
Kyanite and related materials:						
Kyanite		5,300 r	5,900 r	4,500 r	1,800	1,700
Sillimanite		33,700 r	45,000 r	56,600 r	47,600 r	57,100
Lime (shell)		71,000 r	38,000 r	33,000	26,000 r	19,900
Lime (kankar)		360,000	372,000	330,000	241,000	159,000
Magnesite		253,000 r	301,000 r	236,000 r	224,000 r	213,000
Mica:						
Crude		1,200	1,300	1,800 r	1,400 r	1,500
Scrap and waste		7,500	7,500	12,000 r	14,000 r	17,000
Total		8,700	8,800	13,800 r	15,400 r	18,500
Nitrogen, N content of ammonia[4]	thousand metric tons	10,100	10,600	10,500	10,700	10,800
Phosphate rock, including apatite	do.	7,800 r	6,400 r	5,500 r	3,400 r	2,200
Pigments, mineral, natural, ocher		1,100 r	1,200 r	1,200 r	1,400 r	1,500

See footnotes at end of table.

TABLE 1—Continued
INDIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity[3]		2009	2010	2011	2012	2013
INDUSTRIAL MINERALS—Continued						
Pyrite, gross weight		115,000	115,000	110,000	110,000	110,000
Pyroxenite		280,000	260,000	128,000	62,000	16,000
Rare-earths, monazite concentrate, gross weight		5,000	5,200	5,200	5,400	2,900
Salt:						
Rock	thousand metric tons	2 r	1 r	2 r	2	2
Other	do.	16,500	17,000	16,000	17,000	18,000
Total	do.	18,500	18,000	18,000	19,000	20,000
Sand:						
Calcareous	do.	280	285	290	295	290
Silica	do.	2,600 r	3,200 r	4,500 r	4,000 r	3,400
Other	do.	2,000 r	2,100 r	2,500 r	2,600 r	2,600
Slate		14,000	14,500	15,000	15,500	17,000
Soda ash	thousand metric tons	1,400	1,500	1,400	1,500	1,500
Stone, sand and gravel:						
Calcite		54,000 r	41,000 r	50,000 r	68,000 r	87,000
Dolomite	thousand metric tons	5,800 r	5,900 r	5,900 r	6,600 r	7,000
Limestone	do.	230,000 r	243,000 r	259,000 r	275,000 r	279,000
Quartz and quartzite	do.	492,000 r	501,000 r	712,000 r	977,000 r	1,300
Sulfur:						
Byproduct from metallurgy	do.	1,100 r	1,100 r	1,000	1,200 r	1,200
Byproduct from petroleum	do.	1,500 r	1,600 r	1,600 r	1,600 r	1,600
Talc and related materials:						
Pyrophyllite		244,000 r	240,000 r	252,000 r	248,000 r	218,000
Steatite, soapstone		880,000 r	897,000 r	974,000 r	954,000 r	940,000
Vermiculite		12,000 r	17,000 r	12,000 r	8,000 r	10,000
Wollastonite		127,000 r	171,000 r	184,000 r	152,000 r	18,000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand metric tons	450,000	480,000	500,000	550,000	563,000
Lignite	do.	25,000	27,000	28,000	30,000	27,000
Total	do.	475,000	507,000	528,000	580,000	590,000
Gas, natural:						
Gross	million cubic meters	35,000 r	37,000	38,000	40,000	39,600
Marketable	do.	30,000	32,000	33,000	35,000	34,400
Petroleum:						
Crude	thousand 42-gallon barrels	255,000	260,000	265,000	270,000	265,000
Refinery products:						
Liquefied petroleum gas	do.	55,000	58,000	60,000	62,000	61,000
Gasoline	do.	125,000	130,000	135,000	137,000	135,000
Kerosene and jet fuel	do.	120,000	125,000	130,000	133,000	131,000
Distillate fuel oil	do.	480,000	490,000	500,000	520,000	511,200
Residual fuel oil	do.	140,000	145,000	150,000	152,000	149,000
Other	do.	315,000	310,000	300,000	280,000	275,000
Total	do.	1,240,000	1,260,000	1,280,000	1,280,000	1,260,000
Uranium		290	400	400	385	400

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

[2] Table includes data available through October 17, 2014.

[3] In addition to the commodities listed, boron, corundum, and other gemstones (aquamarine, emerald, ruby, and spinel) are produced, but output is not reported, and available information is inadequate to make reliable estimates of output.

[4] Reported figure.

[5] Excludes production from small steel plants.

[6] Not elsewhere specified.

[7] Updated data for clays based on data from the India Bureau of Mines.

[8] India's marketable production is 10% to 20% of mine production.

TABLE 2
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity[e]
Alumina	Indian Aluminium Co. Ltd. (Indian interests, 60.4%, and Alcan Aluminium Ltd., 39.6%)	Belgaum refinery, Karnataka	280.
Do.	National Aluminium Co. Ltd. (NALCO) (Government, 100%)	Dhamanjodi refinery, Odisha[1]	2,300.
Do.	Bharat Aluminium Co. Ltd. [Government, 49%, and Sterlite Industries (India) Ltd., 51%]	Korba refinery, Chhattisgarh	200.
Do.	Utkal Alumina International Ltd. (Hindalco Industries Ltd., 100%)	Koraput refinery, Odisha[1]	1,500.
Do.	Madras Aluminium Co. Ltd. [Sterlite Industries (India) Ltd., 80%, and others, 20%]	Mettur refinery, Tamil Nadu	85.
Do.	Hindalco Industries Ltd. (Aditya Birla Group, 33%; foreign investors, 26%; private Indian investors, 23%; financial institutions, 18%)	Renukoot refinery, Uttar Pradesh	700.
Do.	do.	Belgaum, Karnataka	350.
Do.	do.	Muri, Jharkhand	450.
Do.	Vedanta Aluminium Ltd. (Vedanta Resources plc, 100%)	Lanjigarh, Odisha	1,000.
Aluminum	Indian Aluminium Co. Ltd. (Indian interests, 60.4%, and Alcan Aluminium Ltd., 39.6%)	Alupuram smelter, Kerala	20.
Do.	Vedanta Aluminium Ltd. (Vedanta Resources plc, 100%)	Jharsuguda, Odisha[1]	500.
Do.	National Aluminium Co. Ltd. (NALCO) (Government, 100%)	Angul smelter, Odisha[1]	567.
Do.	Indian Aluminium Co. Ltd. (Indian interests, 60.4%, and Alcan Aluminium Ltd., 39.6%)	Belgaum smelter, Karnataka	70.
Do.	Hindalco Industries Ltd. (Aditya Birla Group, 33%; foreign investors, 26%; private Indian investors, 23%; financial institutions, 18%)	Hirakud smelter, Odisha[1]	161.
Do.	do.	Renukoot, Uttar Pradesh	345.
Do.	Bharat Aluminium Co. Ltd. [Government, 49%, and Sterlite Industries (India) Ltd., 51%]	Korba smelter, Kobra-III smelter, Chhattisgarh	345.
Do.	Madras Aluminium Co. Ltd. [Sterlite Industries (India) Ltd., 80%, and others, 20%]	Mettur smelter, Tamil Nadu	40.
Do.	Hindalco Industries Ltd. (Aditya Birla Group, 33%; foreign investors, 26%; private Indian investors, 23%; financial institutions, 18%)	Renukoot smelter, Uttar Pradesh	562.
Ball clay	Bikaner Ceramics	Rajasthan, Bikaner	75.
Do.	Sampat Lal Daga	do.	NA.
Barite	Andhra Pradesh Mineral Development Corp. Ltd. (Andhra Pradesh State government, 100%)	Cuddapah District mines, Andhra Pradesh	1,600.
Do.	ICL Ltd.	do.	300.
Do.	Associated Mineral Corp.	do.	75.
Do.	Pragathi Minerals	do.	50.
Do.	Vijayalaxmi Minerals Trading Co.	do.	50.
Bauxite	Bharat Aluminium Co. Ltd. [Government, 49%, and Sterlite Industries (India) Ltd., 51%]	Amarkantak Mine, Madhya Pradesh	200.
Do.	Indian Aluminium Co. Ltd. (Indian interests, 60.4%, and Alcan Aluminium Ltd., 39.6%)	Kolhapur District mines, Maharashtra	600.
Do.	Gujarat Mineral Development Corp. (Gujarat State government, 100%)	Kutch and Saurashtra Mines, Gujarat	500.
Do.	Hindalco Aluminium Co. Ltd. (Aditya Birla Group, 33%; foreign investors, 26%; private Indian investors, 23%; financial institutions, 18%)	Mines in Lohardaga District, Jharkhand	750.
Do.	Indian Aluminium Co. Ltd. (Indian interests, 60.4%, and Alcan Aluminium Ltd., 39.6%)	do.	200.
Do.	National Aluminium Co. Ltd. (Government, 100%)	Mines in Panchpatmali Hills, Koraput District, Orissa[1]	6,300.
Do.	Minerals & Minerals Ltd. (Government, 100%)	Mines in Richuguta, Palamau District, Jharkhand	200.
Do.	Ashapura Minechem Ltd	Rajasthan, Gujarat, Maharashtra, Karnataka Kerala, Andhra Pradesh, and Odisha	NA.

See footnotes at end of table.

TABLE 2—Continued
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity[e]
Bauxite—Continued	M. P. State Mining Corp. Ltd.	Chachandeeh Mine, Anuppur District	NA.
Do.	Bharatesh Construction Co.	Maharashtra, Kolhapur	NA.
Do.	Alatage Stone Crushing Ind.	Maharashtra, Raigarh	NA.
Do.	Ram Awatar Agrawal	Madhya, Pradesh	NA.
Do.	Panditrao Mines & Minerals Pvt. Ltd.	Maharashtra, Kolhapur	NA.
Do.	Bombay Minerals Ltd	Asota Mewasa, Gujarat	NA.
Bentonite	Ashpura Minechem Ltd (Ashpura Group)	Kutch, Gujarat	350.
Do.	Ashpura Volclay Ltd. (Ashpura Minechem Ltd. and AMCOL Int. Corp.)	Bhuji and Dharur, India	72.
Do.	Ashpura International Ltd.	Mumbai, India	NA
Do.	Vijaylaxmi Group of Industries	West Rajasthan	NA
Do.	Gimpex Ltd.	Chennai, India	NA
Boron	Borax Morarji Ltd.	Ambernath, Maharashtra	17.
Cement	Ultratech Cement Ltd.	12 integrated plants and 12 grinding units	62.
Do.	Century Cement [Century Textiles and Industries Ltd. (a subsidiary of the Aditya Birla Group, 100%)]	Baikunth plant, Madhya Pradesh	1,120.
Do.	Ambuja Cements Ltd. (Holcim Group, 14.8%)	Plants in 7 States	25.000.
Do.	Coromandel Fertilizers Ltd. [Chevron Chemical Co., 23.55%; International Minerals and Chemical Co., 20.89%; Parry and Co., 10.64%; E.I.D. Parry (India) Ltd., 6.65%; others, 38.27%]	Chilamkur plant, Andhra Pradesh	1,000.
Do.	Dalmia Cement (Bharat) Ltd.	Dalmiapuram and Ariyalur, Tamil Nadu; and Kadapa, Andhra Pradesh	21,000.
Do.	Birla Corp. Ltd. (M.P. Birla Group)	Birla Vikas and Satna, Birla Cement, and Chanderia, Durgapur, Rae Bareli, Durga Hitech	5,780.
Do.	ACC Ltd. (Holcim Group, 67%)	Gagal I and II, Wadi I and II , Jamul, Lakheri Thondebhavi, Kudithini, Kymore, Chanda, Chaibasa and Sindri, Damodhar, Bargarh, Madhukkarai, Tikaria, Vizag	28,800.
Do.	Raymond Cement Works (a division of Raymond Woolen Mills Ltd., JK Singhania, principal shareholder)	Gopalnagar plant, West Bengal	1,250.
Do.	Shree Cement Ltd.	Haridwar plant, Uttarakhand	1,800.
Do.	OCL India Ltd.	Kapilas and Rajgangpur, Odisha[1]	5,500.
Do.	Rajashree Cement (a division of Indian Rayon and Industries Ltd., 100%)	Khor plant, Karnataka	1,020.
Do.	My Home Industries Ltd. (joint venture of My Home Group and CRH plc)	Mellacheruvu and Visakhapatnam in Andhra Pradesh	4,600.
Do.	HeidelbergCement India Ltd.	Narasingarh plant, Haryana	1,090.
Do.	CCI Ltd. (Government, 100%)	Adilabad, Akaltara, Bokajan, Charkhi-Dadri, Kurkunta, Mandhar, Neemuch, Rajban, Tandur, Delhi	3,850.
Do.	Andhra Cements Ltd. (Jaypee Group 100%)	Vizag, Nadikude-Durga Cement	1,420.
Do.	J.K. Cement Works (a division of JK Synthetics Ltd.), 100%	Nimbahera plant, Mangrol, Muddapur Jhari, Gotan, Lakshim Cement, Lakshmi Cement-Kalol	11.000.
Do.	India Cements Co. Ltd. (Government, 26%; Life Insurance Corp. of India, 24%; others, 50%)	Sankarnagar plant and 2 plants, Tamil Nadu; 4 plants, Andhra Pradesh; Mahi plant, Rajasthan	16,000.
Do.	Prism Cement Ltd.	Satna plant, Madhya Pradesh	3,000.
Do.	Jaiprakash Associates Ltd.	Sewagram, Gujarat	2,400.
Do.	Shree Digvijay Cement Co. Ltd.	Shreeniwas plant, Maharashtra	1,070.
Do.	JK Lakshmi Cement Ltd. (a division of Straw Products Ltd., JK Singhania, principal shareholder)	Sirohi plant, Rajasthan and Ahmadabad, Gujarat	4,700.

See footnotes at end of table.

TABLE 2—Continued
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity[e]
Cement—Continued	Lafarge S.A.	Arasmeta and Sonadih, Chhattisgarh; Jojobera, Jharkhand; and Mejia, West Bengal	1,400.
Do.	Manikgarth Cement [Century Textiles and Industries Ltd. (a subsidiary of the Aditya Birla Group, 100%)]	Tehsil Rajura plant, Maharashtra	1,000.
Do.	Vikram Cement [Grasim Industries Ltd. (a subsidiary of the Aditya Birla Group, 100%)]	Vikram plant, Madhya Pradesh	1,000.
Do.	Raasi Cement Ltd. (Andhra Pradesh State government, 50%, and Development Co. Ltd., 50%)	Vishnupuram plant, Andhra Pradesh	1,000.
Do.	Tamil Nadu Cements Corp. Ltd.	Alangulam, Ariyalur, Virundhunagar District	900.
Do.	Madras Cements Ltd.	Ramasamyraja Nagar, Jayantipuram, Alathiyur Works I and II, Ariyalur Uthiramerur, Salem, Kolaghat	13.
Do.	Suarashtra Cement Ltd. and Gujarat Sidhee Cement Ltd. (The Mehta Group)	Gujarat	2,700.
Do.	Jaypee Cement Ltd.	Jaypee Rewa, Jaypee Bela, Jaypee Sadva Khurd, Jaypee Ayodhyaa Dalla Chunar, Jaypee Panipat, Jaypee Kutch, Jaypee Wanakbori, Jaypee Roorkee, Jaypee Wanakbori, Jaypee Bagheri, Bhilai Jaypee.	27.
Do.	Kesoram Industries Ltd.	Kesoram Cement, Vasvadatta Cement	7,250.
Do.	Mangalam Cement Ltd.	Mangalam Cement, Neer Shree Cement	2,000.
Do.	Orient Papers & Industries	Orient Cement, Orient-Cement-Jalgaon	5,000.
Do.	Penna Cement Ltd.	Penna Tadippatri I and II, Penna Ganeshpahad, Penna-Boyareddypalli Ltd., Penna-Tandur	6,500.
Do.	Malabar Cements Ltd.	Malabar Cements, Malabar Cements	620.
Do.	Binani Cement Ltd.	Binani Cement Sirohi, Binani Cement Sikar	6,250.
Do.	Rain Cement Ltd.	Rain Comdt. Unit I, Rain Comdt. Unit LN–1, Rain Comdt. Unit LN–2	4,000.
Do.	KCP Ltd.	KCP Ltd-Macherla, Maktyala	2,350.
Do.	Cement Manufacturing Co. Ltd.	Cement Manufacturing Co. Ltd., Megha T&E Ltd.	1,270.
Do.	Chettinad Cement	Chettinad-Karur, Chettinad Karikkali, Chettinad-Ariyalur	10,500.
Do.	Zuari Cement Ltd.	Zuari Cement, Sri Vishnu Cement	3,400.
Chromite	Mysore Minerals Ltd. (state-owned)	Aladahalli Mines	37.
Do.	do.	Byrapura Mines	15.
Do.	do.	Bhakthara Halli Mines	24.
Do.	do.	Jambur Mines	5.
Do.	do.	Tagadur Mines	12.
Do.	Ferro Alloys Corp. Ltd.	Randia plant, Bhadrak, Cuttack District, Odisha[1]	65.
Do.	Orissa Mining Corp. Ltd. (Orissa Industries Ltd., 100%)	Odisha[1]	300.
Do.	Tata Steel Ltd.	do.	55.
Do.	Ferro Alloys Corp. Ltd.	Dhenkanal and Kendujhar District, Odisha[1]	150.
Do.	Orissa Mining Corp. Ltd. (Orissa Industries Ltd., 100%)	do.	200.
Do.	Mysore Minerals Ltd.	Hassan District, Karnataka	125.
Do.	Orissa Mining Corp. Ltd. (Orissa Industries Ltd., 100%)	do.	100.
Do.	Ferro Alloys Corp. Ltd.	Khammam District, Andhra Pradesh	100.
Do.	Balasore Alloys Ltd.	Sukinda Valley, Jajpur, Odisha[1]	95.
Do.	Indian Metal & Ferro Alloys Ltd.	Therubali, Ryaagada and Choudwar, Cuttack	62.

See footnotes at end of table.

TABLE 2—Continued
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity[e]
Chromite—Continued	Misrilall Mines Pvt Ltd.	Saruabil village, Jajpur District, Odisha[1]	NA.
Do.	Jindal Stainless Ltd.	Jindal Chromite Mines, Jajpur, Odisha[1]	NA.
Coal, bituminous million metric tons	Bharat Coking Coal Ltd. [a subsidiary of Coal India Ltd. (Government, 100%)]	Bihar and West Bengal	36,000.
Do.	Central Coalfields Ltd. [a subsidiary of Coal India Ltd. (Government, 100%)]	Bihar	27,000.
Do.	Eastern Coalfields Ltd. [a subsidiary of Coal India Ltd. (Government, 100%)]	Bihar and West Bengal	21,000.
Do.	Mahanadi Coalfields Ltd. [a subsidiary of Coal India Ltd. (Government, 100%)]	Odisha[1]	21,000.
Do.	North Eastern Coalfields Ltd. [a subsidiary of Coal India Ltd. (Government, 100%)]	Assam	640,000.
Do.	Northern Coalfields Ltd. [a subsidiary of Coal India Ltd. (Government, 100%)]	Madhya Pradesh and Uttar Pradesh	24,000.
Do.	Singareni Collieries Co. Ltd. (Andhra Pradesh State government, 50%, and Government, 50%)	Andhra Pradesh and Maharashtra	18,000.
Do.	South Eastern Coalfields Ltd. [a subsidiary of Coal India Ltd. (Government, 100%)]	Chhattisgarh	36,000.
Do.	Western Coalfields Ltd. [a subsidiary of Coal India Ltd. (Government, 100%)]	Madhya Pradesh and Maharashtra	18,000.
Coal, lignite	Neyveli Lignite Corp. Ltd. (NLC) (Government, 100%)	Tamil Nadu	17,000.
Copper, mine	Hindustan Copper Ltd. (HCL) (Government, 100%)	Indian Copper Complex Mines, Ghatsila District, Jharkhand	450.
Do.	do.	Khetri Copper Complex Mines, Khetrinagar Rajasthan	1,400.
Do.	do.	Malanjkhand Copper Complex Mines, Balaghat District, Madhya Pradesh	2,000.
Copper, metal	Hindalco Industries Ltd. (Aditya Birla Group, 33%; foreign investors, 26%; private Indian investors, 23%; financial institutions, 18%)	Birla Copper Complex smelter, Dahej, Gujarat	500.
Do.	Hindustan Copper Ltd. (HCL) (Government, 100%)	Indian Copper Complex smelter-refinery, Ghatsila District, Jharkhand	21.
Do.	do.	Khetri Copper Complex smelter-refinery, Khetrinagar District, Rajasthan	31.
Do.	Sterlite Industries (India) Ltd.	Tuticorin smelter, Tamil Nadu	400.
Do.	do.	Silvassa refinery, Gujarat	300.
Do.	Jhagadia Copper Ltd.	Jhagadia, Gujarat	50.
Diamond carats	National Mineral Development Corp. Ltd. (NMDC) (Government, 100%)	Mahjgawan Mine	25,000.
Fire clay	Shanta Sales Corp.	Rajasthan, Bikaner	NA.
Fluorite	Maharashtra State Mining Corporation Ltd.	Dongargaon, Maharashtra, Chandrapur	12.
Do.	Gujarat Mineral Development Corporation Ltd.	Gujarat, Vadodara	185.
Do.	Rajasthan State Mines and Minerals Ltd.	Rajasthan, Jalore	NA.
Gold kilograms	Hutti Gold Mines Co.	Hutti Mine, Karnataka	656.
Do. do.	do.	Uti Mine, Karnataka	26.
Do.	Mahmohan Mineral Industries (Pvt) Ltd.	Kunderkocha Mine, Jharkhand	NA.
Graphite	Agrawal Graphite Industries Ltd.	Belpara District, Odisha[1]	10.
Do.	Tamil Nadu Minerals Ltd.	Sivaganga District, Tamil Nadu	NA.
Gypsum	FCI Aravali Gypsum and Minerals India Ltd.	Kavas-Utarali group of mines, Mohangarh group of mines, Bikaner group of mines Suratgarh group of mines, and Raimsinghpur group of mines, Rajasthan	426.
Iron and steel, crude steel	Visvesvaraya Iron and Steel Ltd. (Karnataka State government, 60%, and Government-owned Steel Authority of India Ltd., 40%)	Bhadravati steel plant, Karnataka	180.
Do.	Steel Authority of India Ltd. (Government, 100%)	Bhilai steel plant, Jharkhand	4,930.
Do.	do.	Bokaro steel plant, Jharkhand	4,600.

See footnotes at end of the table.

TABLE 2—Continued
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity[e]
Iron and steel, crude steel—Continued	Indian Iron and Steel Co. Ltd. (a wholly owned subsidiary of Government-owned Steel Authority of India Ltd.), 100%	Burnpur steel plant, West Bengal	1,500.
Do.	Ispat Industries Ltd.	Dolvi, Maharashtra	3,000.
Do.	Steel Authority of India Ltd. (Government, 100%)	Durgapur steel plant, West Bengal	1,600.
Do.	Tata Steel Ltd.	Jamshedpur steel plant, Jharkhand	6,800.
Do.	do.	Jagdalpur, Chattisgarh	2,000.
Do.	do.	Duburi, Odisha[1]	3,000.
Do.	Steel Authority of India Ltd. (Government, 100%)	Rourkela steel plant, Odisha[1]	1,800.
Do.	Rashtriya Ispat Nigam Ltd.	Visakhapatnam steel plant, Andhra Pradesh	6,300.
Do.	JSW Steel Co. Ltd.	Vijayanagar, Karnataka	7,800.
Do.	Ministeel plants (privately owned)	180 plants located throughout India	4,700.
Do.	Essar Steel Co. Ltd.	Hazira, Gujarat	3,000.
Do.	Lloyds Steel Industries Ltd.	Wardha, Maharashtra	500.
Do.	MSP Steel and Power Ltd.	Raipur, Chhattisgarh	750.
Iron ore	National Mineral Development Corp. Ltd. (NMDC) (Government, 100%)	Bailadila, Chhattisgarh	9,000.
Do.	Steel Authority of India Ltd. (Government, 100%)	Bastar and Durg District, Chhattisgarh; Bolani, Odisha;[1] and Chiria, Jharkhand	7,000.
Do.	Kudremukh Iron Ore Co. Ltd. (Government, 100%)	Kudremukh, Chikmagalur District, Karnataka	10,300.
Do.	National Mineral Development Corp. Ltd. (NMDC) (Government, 100%)	Donimalai, Karnataka	9,000.
Do.	Chowgule and Co. Ltd.	Goa	2,500.
Do.	Dempo Mining Corp. Ltd.	do.	2,500.
Do.	V.M. Salgaocar & Bros. Pvt. Ltd.	do.	2,500.
Do.	Sesa Goa Ltd. (Vedanta Resources plc, 51%)	Codli and Sonshi, Goa	NA.
Do.	Steel Authority of India Ltd. (Government, 100%)	Kendujhar District, Odisha[1]	3,000.
Do.	Tata Steel Ltd.	do.	2,000.
Do.	NSL Consolidated Ltd. (China Metallurgical Group Corp., 100%)	Mangal, Andhra Pradesh	200.
Do.	Indian Iron and Steel Co. Ltd. (a wholly owned subsidiary of Government-owned Steel Authority of India Ltd.), 100%	Singhbhum District, Bihar	2,500.
Do.	Steel Authority of India Ltd. (Government, 100%)	do.	3,500.
Do.	Tata Steel Ltd.	do.	3,500.
Kaolin	20 Microns Ltd.	Bhuj, Gujarat	65
Do.	English India Clays Ltd.	Veli, Kerala	240.
Kyanite	Associated Mining Co.	Bhandara District, Maharashtra	10.
Do.	Maharashtra Mineral Corp. Ltd.	do.	10.
Do.	Bihar State Mineral Development Corp. Ltd. (Bihar State government, 100%)	Singhbhum District, Bihar	10.
Do.	Hindustan Copper Ltd. (HCL) (Government, 100%)	do.	22.
Lead:			
Primary	Hindustan Zinc Ltd. (Sterlite Opportunities and Ventures Ltd., 64.9%, and Government, 29.5%)	Chanderiya smelters, Rajasthan	85.
Do.	do.	Tundoo smelter, Bihar	8.
Do.	do.	Dariba smelter	100.
Secondary	Indian Lead Co.	Thane refinery, Mumbai, Maharashtra	12.
Do.	do.	Refinery at Kolkata	12.
Lead ore	Hindustan Zinc Ltd. (Sterlite Opportunities and Ventures Ltd., 64.9%, and Government, 29.5%)	Agnigundala Mine, Andhra Pradesh	72.
Do.	do.	Sargipalli Mine, Odisha[1]	150.
Lead-zinc ore	do.	Rampura-Agucha Mine, Rajasthan	6,500.
Do.	do.	Zawar Mine Group, Rajasthan	1,200.

See footnotes at end of table.

TABLE 2—Continued
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity[e]
Magnesite		Steel Authority of India Ltd. (Government, 100%)	Salem, Tamil Nadu	150.
Do.		Dalmia Magnesite Corp.	do.	72.
Do.		Tamil Nadu Magnesite Ltd. (Tamil Nadu State government, 100%)	do.	150.
Manganese ore[2]		MOIL Ltd. (Government, 100%)	Ukwa Mine, Madhya Pradesh	55.
Do.		do.	Balaghat, Madhya Pradesh	310.
Do.		do.	Chikla Mine, Maharashtra	150.
Do.		do.	Munsar Mine, Maharshtra	55.
Do.		do.	Gumgaon, Maharshtra	60.
Do.		Falechand Marsingdas	Andhra Pradesh	NA.
Do.		J.A. Trivedi Bros.	do.	NA.
Do.		Sandur Manganese and Iron Ores Ltd.	Bellary, Karnataka	NA.
Do.		Eastern Mining Co.	North Kanara, Karnataka	NA.
Do.		Mysore Minerals Ltd.	do.	NA.
Do.		Mangilall, Rungta (Pvt.) Ltd.	Keonjhar, Odisha[1]	NA.
Do.		Orissa Mining Corp. Ltd.	do.	NA.
Do.		Rungta Mines (Pvt.) Ltd.	do.	NA.
Do.		Tata Steel Ltd.	Ferromanganese plant, Odisha	NA.
Do.		S. Lall & Co.	do.	NA.
Do.		Tata Steel Ltd.	Keonjhar, Odisha[1]	NA.
Do.		Orissa Mineral Development Co. Ltd.	Koraput, Odisha[1]	NA.
Do.		Orissa Mining Corp. Ltd.	do.	NA.
Do.		Mysore Minerals Ltd.	Shimoga, Karnataka	NA.
Do.		Aryan Mining & Trading Corp.	Sundargarh, Odisha[1]	NA.
Do.		Orissa Manganese & Minerals (Pvt.) Ltd.	do.	NA.
Do.		Tata Steel Ltd.	do.	NA.
Do.		R.B.S. Shreeram Durga Prasad and Falechand Marsingdas	Vizianagaram, Andhra Pradesh	NA.
Do.		Radhika Metals & Minerals Pvt. Ltd.	NA	NA.
Mica		Micafab India Pvt. Ltd.	Sydapuram Mandal, Andhra Pradesh	4,500.
Do.		Premier Mica Co.	Rjupalem, Andhra Pradesh	200.
Do.		Dwarakananad Reddy, and 4 others, 1-C, Vaibhav Enclave	Nellore, Andhra Pradesh	NA.
Petroleum, refined	thousand 42-gallon barrels	Cochin Refineries Ltd. (Oil and Natural Gas Corp., 55%, and private interests, 45%)	Ambalamugal refinery, Kerala	93.
Do.	do.	do.	Haldia refinery, West Bengal	61.
Do.	do.	Reliance Industries Ltd.	Jamnagar refinery, Gujarat	540.
Do.	do.	do.	Koyali refinery, Gujarat	185.
Do.	do.	Madras Refineries Ltd. (Oil and Natural Gas Corp., 52%, and private interests, 48%)	Madras refinery, Tamil Nadu	131.
Do.	do.	Bharat Petroleum Corp. Ltd. (Oil and Natural Gas Corp., 67%, and private interests, 33%)	Mahul refinery, Mumbai, Maharashtra	135.
Do.	do.	Hindustan Petroleum Corp. Ltd. (Oil and Natural Gas Corp., 51%, and private interests, 49%)	do.	110.
Do.	do.	Essar Oil Ltd.	Vadinar refinery, Gujarat	375.
Do.	do.	do.	Visakhapatnam refinery, Andhra Pradesh	90.
Do.	do.	Indian Oil Corp. (Oil and Natural Gas Corp., 91%, and private interests, 9%)	Mathura refinery, Uttar Pradesh	156.
Do.	do.	do.	Panipat refinery, Haryana	240.
Phosphate rock		Rajasthan State Mineral Development Corp. Ltd. (Rajasthan State government, 100%)	Jamarkotra,Badgaon, Dakankotra, Kanpur, Kharbaria-ka-Guda, and Sallopat Mines, Rajasthan	20.
Do.		Pyrites Phosphates and Chemicals Ltd.	Durmala and Maldeota underground	NA.
Do.		Madhya Pradesh State Mining Corp. Ltd. (Madhya Pradesh State government, 100%)	Hirapur (Maddeora) and Khatamba Mines, Madhya Pradesh	NA.

See footnotes at end of the table.

TABLE 2—Continued
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity[e]
Phosphate rock—Continued	Madhya Pradesh State Mining Corp. Ltd. (Madhya Pradesh State government, 100%)	Hirapur Mine (Tigoda), Madhya Pradesh	NA.
Do.	do.	Jhabua Mine, Madhya Pradesh	NA.
Do.	Hindustan Zinc Ltd. (HZL) (Sterlite Opportunities and Ventures Ltd., 64.9%, and Government, 29.5%)	Maton Mine, Rajasthan	NA.
Titanium, ilmenite-rutile ore	Kerala Minerals and Metals Ltd. (Kerala State government, 100%)	do.	52 ilmenite; 34 rutile; 65 zircon; 4 sillimanite.
Do.	Indian Rare Earths Ltd. (IREL) (Government, 100%, Department of Atomic Energy)	do.	154 ilmenite; 10 rutile; 12 zircon; 10 sillimanite.
Do.	do.	Orissa Sands Complex, Ganjam, Odisha[1]	220 ilmenite; 10 rutile; 5 zircon; 10 sillimanite; 24 garnet.
Do.	do.	Manavalakurichi, Tamil Nadu	90 ilmenite; 4 rutile; 10 zircon; 6 monazite; 9 garnet.
Do.	Trimex Sands Pvt. Ltd. (Trimex Group)	Sirkurman deposit, Srikakulam Andhra Pradesh	200 illmenite; 6 rutile; 6 zircon; 60 garnet; 50 sillimanite.
Do.	V.V. Mineral Ltd.	Thoothukudi, Tamil Nadu	450 ilmenite; 12 rutile; 18 zircon; 24 zircon-sillimanite; 150 garnet.
Do.	Beach Minerals Co. Pvt. Ltd., Tamil Nadu	Kuttam, Chennai, Tamil Nadu	150 ilmenite.
Uranium ore	Uranium Corp. of India (Government 100%, Department of Atomic Energy)	Jaduguda, Jharkhand, Tummalpalle, Andhra Pradesh	5,190.
Zinc	Binani Zinc Ltd. (Binani Industries Ltd., 89.9%)	Binanipuram smelter, Kerala	38.
Do.	Hindustan Zinc Ltd. (HZL) (Sterlite Opportunities and Ventures Ltd., 64.9%, and Government, 29.5%)	Rampura, Agacha Mine, Chanderiya smelter, Rajasthan	6,150.
Do.	do.	Sindesar Khurf Mine, Rajasthan	2,000.
Do.	do.	Rajpura Dariba Mine, Rajasthan	900.
Do.	do.	Kayad Mine, Rajasthan	350.
Do.	do.	Zawar Mine, Rajasthan	1,200.
Do.	do.	Chanderiya Zinc Smelter, Rajasthan	525.
Do.	do.	Dariba Smelting Complex, Rajasthan	210.
Do.	do.	Zinc Smelter Debari, Rajasthan	88.
Do.	do.	Zinc smelter, Vizag, Andhra Pradesh	56.

[e]Estimated. Do., do. Ditto. NA Not available. -- Zero.
[1]Formerly Orissa.
[2]Capacity of clusters of surface mines varies extremely, depending on demand. Estimated total capacity is 3.0 million metric tons per year.

TABLE 3
INDIA: ESTIMATED RESERVES OF MAJOR MINERAL COMMODITIES IN 2013

(Thousand metric tons unless otherwise specified)

Commodity		Reserves
Apatite		2,100
Asbestos (all grades)		2,500
Ball clay		17,000
Barite		32,000
Bauxite		593,000
Calcite		3,000
Chalk		4,000
Chromite ore (all grades)		107,000
Coal, lignite		123,181,630
Copper ore		238,000
Corundum	metric tons	600
Diamond	carats	985
Diaspore		3,000
Dolomite		738,000
Dunite		17,000
Feldspar		45,000
Fireclay		30,000
Fluorite		5,000
Garnet		6,700
Gold, metal	metric tons	111
Graphite		11,000
Gypsum		39,000
Iron ore:		
Crude ore		8,100,000
Iron content		5,000,000
Kaolin		177,000
Kyanite		1,600
Lead and zinc ore		103,000
Lead (content Pb)		2,200
Limestone		15,000,000
Magnesite		21,000
Manganese ore		49,000
Mica		190
Ochre		55,000
Perlite		430
Phosphate rock		70,000
Pyrophyllite		23,300
Ruby	kilograms	236
Salt (rock)		16,000
Silica sand and quartz		430,000
Sillimanite		4,100
Silver (content Ag)		8,000
Talc		90,000
Titanium:		
Ilmenite		85,000
Rutile		7,400
Vermiculite		1,700
Wollastonite		2,500
Zinc (content, Zn)		11,000
Zircon		33,700
Zirconium		3,400

Source: Indian Bureau of Mines, 2013; U.S. Geological Survey Mineral Commodity Summaries 2015