



2008 Minerals Yearbook

INDIA

THE MINERAL INDUSTRY OF INDIA

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India has globally significant mineral resources; its deposits of coal, bauxite, and iron ore account for 10%, 4%, and 3% of the world's total resources, respectively. In terms of the relative size of its mineral resources, India's barite resource was the second largest in the world after China; iron ore, the third largest; coal [which totaled 250 billion metric tons (Gt)], the fourth largest; and bauxite (2.3 Gt), the sixth largest. The country's resources of chromium, limestone, and manganese were also among the 10 largest in the world. Of these resources, 1.4 Gt of bauxite and 62 Gt of coal are located in the State of Orissa, which also hosts resources of chromium, cobalt, nickel, and titaniferous magnetite (Ministry of Mines, 2009, p. 21).

In terms of production, India was among the leading producers in the world of mica (first); barite, chromium, and talc (second); bauxite and coal (third); iron ore and kyanite (fourth); manganese ore and steel (fifth); zinc (seventh); and aluminum (eighth) (Ministry of Mines, 2009, p. 11).

Minerals in the National Economy

India's mineral industry contributed 1.9% of the gross domestic product (GDP) and was an important sector of the economy in fiscal year 2008-09. Mineral production in terms of tonnage increased by 2.34%, and total output in terms of value increased by 7.1%. The value of mineral fuels accounted for 62% of total output; metals, 25%; and industrial minerals, 12%. The value of mineral exports increased by 17% and that of mineral imports increased by 15% compared with those of fiscal year 2007-08 (Ministry of Mines, 2009, p. 8-9, 109-111).

Government Policies and Programs

In March, the Government approved a new mining policy designed to simplify the country's mining regulations. The Parliament would begin consideration of the proposed legislation in August. The main regulatory changes would be accelerating the mining lease application process to between 6 and 12 months from more than a year, making mining lease approval automatic for companies that discover the mineral resources, and granting companies the rights to deal with prospecting data (Industrial Minerals, 2008i).

Once a new mining policy is in place, the Government expected to increase foreign direct investment (FDI) in mining to \$125 billion in 5 years. The Government also decided to allow 100% FDI in the Kerala mineral sand project. The new mining policy would aim to liberalize the market by smoothing the transition between prospecting to mining and unbundling the buying and selling of exploration data. The policy also would revise the way that royalty rates are determined for certain industrial minerals; instead of being assessed on a tonnage basis, royalty rates for ball clay, graphite, kaolin, quartz, and silica sand are to be based on the assessed value. For dolomite, limestone, and slate, the royalty rates would continue to be

based on the number of units produced (Industrial Minerals, 2008d).

The Government planned to replace the export duty on iron ore with a uniform 10% to 15% tax on the free-on-board value of exports. In 2007, India introduced a \$7.56 per metric ton duty on iron ore with more than 62% iron and a \$1.26 per metric ton duty on iron ore with up to 62% iron. India exported 93 million metric tons (Mt) of iron ore in fiscal year 2006-07, of which 75% went to China (Metal Bulletin, 2008a).

The Government exempted local fertilizer manufacturers from the 5% custom tax on imports of phosphate rock, effective June 10, 2008. The Indian fertilizer market experienced rapid growth, and the prices of such raw materials as phosphate rock and potash increased substantially. Fertilizers and Chemicals Travancore Ltd. was to develop a gypsum-based fertilizer to meet the demand of the growing market for fertilizers (Industrial Minerals, 2008c).

The Finance Bill 2008 proposed to withdraw the tax holiday for oil and gas companies engaged in refining activities if such activities were to commence on or after April 1, 2009. Under the Petroleum Tax Guide 1999, oil and gas companies engaged in mineral fuel exploration and production activities are entitled to claim 100% tax holiday for a period of 7 years. The guide defines "mineral fuels" as fuels obtained from below the surface in the form of hydrocarbons—the heavier form is crude oil and the lighter form is natural gas (Alexander's Gas & Oil Connections, 2008b).

Production

In 2008, production of mined lead and zinc rose by 12.7% and 7.3%, whereas that of refined lead and zinc increased by 11.5% and 25.1%, respectively, compared with the outputs of 2007. The increases were attributed to expanded mining operations and capacity additions at the smelters. The country mined 17.5% more chromium and produced 12.5% less cobalt metal. Gold production declined by 10%, and silver output increased by 16.7%. India produced nearly 55 Mt of crude steel and 20 Mt of direct-reduced iron in 2008, which was an increase of 4% and 11.6%, respectively. Crude steel capacity utilization was 89%. Output of natural gas increased by 2%, and that of crude oil decreased slightly (table 1).

Structure of the Mineral Industry

The Ministry of Mines is responsible for the survey and exploration of all minerals except natural gas, petroleum, and uranium; for the mining and metallurgy of nonferrous metals; and for administration of the Mines and Minerals Act of 1957. Four public-sector companies are currently under the Ministry and the other two have been disinvested and management control transferred to strategic partners; the Ministry, however, continues to hold minority interest in these two companies. The

mining industry was characterized by a large number of small operational mines, which totaled 2,950 in 2008. Public-sector companies continued to play a dominant role in mineral production; they controlled the mining and processing and were the main producers of aluminum, copper, and gold. Small mines were owned mostly by private-sector companies that produced cement and manganese ore.

Mineral Exploration Corp. Ltd. is responsible for the country's mineral exploration. The Ministry of Coal has the responsibility for determining the policies and strategies for the exploration for and development of coal and lignite reserves. Coal India Ltd., which is under the Ministry, has nine coal-producing subsidiaries, including Bharat Coking Coal Ltd. for coking coal and Neyveli Lignite Corp. Ltd. for lignite; it also owned 50% of Singareni Collieries Co. Ltd. Total employment in the mineral industry in 2008 was about 510,000 people (table 2).

Mineral Trade

India continued to be largely self-sufficient in mineral commodities, which were used as primary raw materials in various industries. India exported, in descending order of value, diamond (mostly cut), iron ore, granite, zinc ore and concentrate, chromium, bauxite, and alumina in fiscal year 2007-08. The country imported, in descending order of value, crude petroleum, diamond (uncut), and other commodities, including coal, coke, copper ores and concentrates, natural gas, phosphate rock, and sulfur (Ministry of Mines, 2009, p. 38-39). India exported 3.8 Mt of finished steel products and imported 5.8 Mt.

Commodity Review

Metals

Aluminum.—Sterlite Industries (India) Ltd.'s 3-million-metric-ton-per-year (Mt/yr) bauxite mining project at Lanjigarh in the State of Orissa was approved by India's Supreme Court despite the protests of farmers and indigenous communities. Mine life was expected to be 18 years. Bauxite would be used for the company's new \$800 million 1.4-Mt/yr alumina refinery, which would also be located at Lanjigarh. The Court asked the company to invest at least \$2.5 million per year in the region to help local tribes (Kosich, 2008).

National Aluminium Co. Ltd. planned a joint-venture project to expand its existing specialty alumina operations, which currently produced 26,400 metric tons per year (t/yr) (comprising 19,400 t/yr of specialty alumina and 7,000 t/yr of specialty alumina hydrate) for the domestic refractory and ceramics market. The project would increase production capacity to 100,000 t/yr for the overseas market. The Indian market for specialty alumina was 40,000 to 50,000 t/yr. The raw material for specialty alumina was sourced from the company's bauxite mines in the State of Orissa, which produced 4.8 Mt/yr of bauxite in 2008; plans were in place to increase the production capacity to 6.3 Mt/yr by 2009. The company also planned to upgrade the production capacity of its alumina refinery to 2.1 Mt/yr at about the same time (Industrial Minerals, 2008h).

Vedanta Resources plc planned to invest \$9.8 billion to increase its aluminum smelting capacity to 2.6 Mt/yr by 2012 from the current 1 Mt/yr. Upon completion, Vedanta Resources would be Asia's leading aluminum producer. The existing capacity included the company's \$5.65 billion Jharsuguda II project in the State of Orissa, which comprised a 1.25-Mt/yr aluminum smelter and a 1,980-megawatt (MW) captive thermal powerplant, and the \$2 billion Korba III project, which comprised a 325,000-t/yr aluminum smelter and a 1,200-MW captive thermal powerplant in the State of Chhattisgarh. To achieve the targeted capacity, Vedanta Resources would increase its alumina production capacity at Lanjigarh to 5 Mt/yr from 1.4 Mt/yr with an investment of \$2.15 billion; debottleneck the existing capacity, which would add 600,000 t/yr of capacity; and build three new alumina production plants with a capacity of 1 Mt/yr each (Vedanta Resources plc, 2008).

Hindalco Industries Ltd. acquired Novelis Ltd. (a subsidiary of Alcan Inc. of Canada), which owned a technology to develop aluminum alloy. Hindalco planned to use the value-added aluminum alloy to replace steel in the automobile industry. Although the aluminum alloy was expected to make a car 40% more expensive than a car made with steel, the alloy was lighter but would provide as much strength and shaping capability as steel (Metalworld News Digest, 2008).

Chromium.—CRONIMET Mining GmbH of Germany acquired a 70.5% interest in GMR Ferro Alloys and Industries Ltd., which would become CRONIMET Ferro Alloys (India) Ltd. CRONIMET Ferro Alloys was a producer of ferrochromium; it had a melting plant that included two furnaces with capacities of 6 megavoltamperes (MVA) and 9 MVA, respectively. The plant employed 230 people, produced 27,500 t/yr of ferrochromium, and exported about 75% of its output to China, Europe, Japan, and the Republic of Korea (CRONIMET Group, 2008).

Copper.—Pebble Creek Mining Ltd. of Canada continued exploration of its Askot project in the State of Uttarakhand, which was a massive sulfide deposit of copper and zinc that contains significant amounts of gold, lead, and silver. The company received Government approval of its mining lease application in 2008. The mine plan and environmental and forest clearance applications still had to be approved by Government agencies. Subsequently, the State government of Uttarakhand granted the company a mining lease that covered an area of 386 hectares (ha). In 2007, the company drilled 14 holes for a total of 3,505 meters (m) (Pebble Creek Mining Ltd., 2008).

India Resources Ltd. of Australia's Surda project, which was located in the Indian Copper Complex in the State of Jharkhand supplied copper concentrate to the Moubhandar smelter; the smelter was owned and operated by Hindustan Copper Ltd. (HCL) and had a production capacity of 20,000 t/yr of copper cathode. The initial supply of copper concentrate was targeted to be 4,500 metric tons (t) at a grade of 23% copper. The remaining copper concentrate would be imported by HCL or sourced from its Malanjkhand Mine in the State of Madhya Pradesh (Asia Miner, The, 2008b).

Gold.—The Jagpura gold prospect in the State of Rajasthan was 70% owned by Indo Gold Ltd. (IGL) of Australia and 30% owned by Metals Mining India Pvt Ltd. The operator was Indo

Gold Mines Pvt Ltd., in which IGL had a 70% interest. The area covered 2,013 square kilometers (km²) and contained gold and base-metal prospects. Drillings were done at the Mahi and the Panch Mahuri zones of the Bhukia prospect, and the estimated resource was 54,000 kilograms of gold to a depth of 150 m. The mineralization at Bhukia was recognized as a potentially large, low-grade gold deposit (Indo Gold Ltd., 2008).

Iron and Steel.—Kudremukh Iron Ore Co. Ltd. restarted its pellet plant in 2007 and produced and exported 2 Mt of pellet. In 2008, it produced and exported 3.2 Mt from its installed production capacity of 3.5 Mt/yr. The company had iron ore mines in Kudremukh on the Western Ghats and a pelletization plant in Mangalore. The iron ore was transported through pipelines to the plant, and the pellets were exported to China, Iran, Japan, and Taiwan (Metal Bulletin, 2008d).

Outotec Oyj of Finland reached an agreement with Tata Steel for the delivery of an iron ore pelletizing plant to be built at Tata Steel's steel works in Jamshedpur. The contract included basic and detailed engineering, supply of critical and proprietary equipment, and technical assistance services. Outotec's local partner in the project was Larsen & Toubro Ltd. When completed in 2011, the pelletizing plant would be the largest in India with a 768-square-meter grate area. Outotec had previously delivered four sinter plants to Tata Steel's Jamshedpur works (Outotec Oyj Stock Exchange, 2008).

Metso Minerals India Pvt. Ltd. would supply an iron ore beneficiation plant to Ispat Industries Ltd.'s Hospet-Bellary Mine in the State of Karnataka. The order included a scrubber, a spiral classifier, a high-gradient magnetic separator, a vertical plate pressure filter, lamella thickeners, and pumps. The plant would treat 250 metric tons per hour (t/hr) of iron ore fines (Metso Corp., 2008). The Hospet-Bellary region is rich in iron ore; a large portion of the region's output is exported, and illegal mining was common. The Karnataka State police seized 200,000 t of iron ore worth \$5.8 million from illegal mining and smuggling (Metal Bulletin, 2008b).

Output of iron ore from three mines at the Bailadila mining complex in the State of Chhattisgarh, which was run by National Mineral Development Corp. Ltd. (NMDC), stopped temporarily after rebels blew up power transmission towers in June. The three mines produced a total of 23 Mt/yr of iron ore in 2008. NMDC was a leading producer and supplier of iron ore to domestic steelmakers, such as Essar Steel Co. Ltd., Ispat Industries, and Rashtriya Ispat Nigam Ltd., and Japanese steel producers, such as JFE Steel Corp. and Nippon Steel Corp. (Mukherjee, 2008).

The Supreme Court of India approved a proposal by Pohang Iron and Steel Co. Ltd. (POSCO) of the Republic of Korea to use 1,210 ha of forest land for iron ore mining and to build a \$12 billion steel plant at Jagatsinghpura in the State of Orissa. The villagers passed a resolution declaring its forest a protected community forest under the Forest Rights Law, which prohibits any entity to displace people from forest land until their rights have been settled (Kosich, 2008).

ArcelorMittal of Luxembourg planned to build a 6-Mt/yr integrated steel plant in the State of Chhattisgarh and to mine iron ore resources in the State. The cost for the new plant was estimated to be \$4.1 billion. The State government allocated

65 Mt of iron ore for the mining project, which was not sufficient for the steel plant. Talks with the State government regarding an assured supply of iron ore were ongoing (Asia Miner, The, 2008a).

MSP Steel and Power Ltd. planned to expand the output of its steel plant at Raipur in the State of Chhattisgarh to 1 Mt/yr from 750,000 t/yr. The company had plans for further expansion at the site. MSP Steel also produced 750,000 t/yr of direct-reduced iron, 170,000 t/yr of pig iron, and 27,000 t/yr of ferroalloys and had a 36-MW captive powerplant. The company's coal projects in the States of Chhattisgarh and Maharashtra would be commissioned in 2010 and 2011, respectively (Metal Bulletin, 2008c).

Lead and Zinc.—Hindustan Zinc Ltd. (HZL) reported that ongoing exploration yielded an increase of 28.7 Mt in reserves and resources containing 4 Mt of zinc-lead metal. Total resources as of March 2008 were 232.3 Mt containing 27.5 Mt of zinc-lead metal. The company's exploration activities were in the Sindesar Khurd and the Rampura Agucha Mines. Ore production would be expanded to 6 Mt/yr from 5 Mt/yr at Rampura Agucha by 2010 and to 1.5 Mt/yr from 0.3 Mt/yr at Sindesar Khurd by 2012 (London Stock Exchange Group, 2008, p. 3).

HZL began production of zinc metal from its Phase II capacity expansion of 170,000 t/yr at the company's Chanderiya lead/zinc smelter in the State of Rajasthan. The total zinc capacity of the company would be 670,000 t/yr after a series of expansions. The company's two brownfield smelter projects at Rajpura Dariba in Rajasthan would increase the production capacities of zinc and lead by 210,000 t/yr and 100,000 t/yr, respectively. A captive thermal powerplant with a capacity of 160 MW would be set up at Rajpura Dariba by 2010 (London Stock Exchange Group, 2008, p. 1).

Rare Earths.—State-owned Indian Rare Earths Ltd. (IREL) planned to restart rare-earth production from its mineral sand operations. Rare-earth production at its plant at Aluva in the State of Kerala ceased in 2004 owing to strong competition from China. This plant would process 12,000 t/yr of monazite containing 7,000 t of rare-earth oxide in April 2010. The company engaged in chemical processing of monazite to yield thorium compounds, rare-earth chlorides, and tri-sodium phosphate. The company also was setting up a monazite processing plant in the State of Orissa where its mines and minerals separation plants were located (Industrial Minerals, 2008f).

Titanium.—Trimex Group was granted permission to begin production at its 200,000-t/yr-capacity ilmenite plant in the State of Andhra Pradesh; the facility was to be operated by its subsidiary Trimex Sands Pvt. Ltd. State-owned IREL produced 250,000 t/yr of ilmenite on average, and had plans to increase its production capacity to 750,000 t/yr. In addition to ilmenite, the Trimex plant would also produce 80,000 t/yr of sillimanite, 80,000 t/yr of garnet, 6,000 t/yr of rutile, and 6,000 t/yr of zircon. The deposit, which spans an area of 7.2 km² in the Srikumam District, contained 5.5 Mt of ilmenite reserves. Walchandnagar Industries Ltd. would be responsible for the plant's engineering procurement and construction. Downer EDI Mining-Mineral Technologies of Australia would supply the processing equipment (Industrial Minerals, 2008k).

IREL also mined and separated heavy minerals from beach sand, such as garnet, ilmenite, monazite, rutile, sillimanite, and zircon. Its minerals division had production plants at Chavara, Manavalakurichi, and OSCOM. At Chavara, the unit used a dredge and wet concentrator to exploit the inland deposits to generate sand feed containing 85% heavy minerals. The sand feed was subjected to final concentration carried out by being fed through a host of spirals to enrich to the concentrate 97% to 98% heavy minerals. Separation of minerals was by electrical and magnetic methods as well as by specific gravity (Indian Rare Earths Ltd., 2008).

The Government's decision to allow 100% FDI in the mineral sands industry of Kerala State received strong opposition from the State government and another party. The States of Kerala and Orissa have significant resources and production of mineral sands. Kerala contained 39% of India's mineral sand resources and IREL expanded its mining operations to 500,000 t/yr from 250,000 t/yr of ilmenite. The opposition group stressed that mining would upset the ecology of the areas and that the vital minerals would be exported (Industrial Minerals, 2008g).

Production at a \$400 million joint-venture titanium dioxide pigment plant at Chatrapur in the State of Orissa was expected to begin in March 2008. The joint venture was between Saraf Agencies Pvt. Ltd. and Russia's Bank of Development and Foreign Economic Affairs and JSC Technochim Holdings. The key raw material would be supplied by IREL and Russia would provide the processing technology. The Government would invest \$125 million, and Saraf Agencies would invest \$36.4 million. India's other titanium dioxide pigment producers were Kerala Minerals and Metals Ltd., Kilburn Minerals Ltd., and Travancore. Balamurugan Chemicals Pvt. Ltd. planned to establish a new \$20 million 15,000-t/yr titanium dioxide pigment plant at Tuticorin in the State of Tamil Nadu and to produce iron oxide pigment as secondary product (Industrial Minerals, 2008e).

Industrial Minerals

Cement.—With a cement production capacity of 185 Mt/yr in 2008, India planned to add 150 Mt/yr of capacity in the next 5 years, reaching 335 Mt/yr in 2013. Sagar Cements Ltd. planned to set up a 5-Mt/yr cement plant in the State of Karnataka. Cimentos de Portugal (Cimpor) acquired a 20% interest in Shree Digvijay Cement Co. Ltd. in the State of Gujarat, raising its stake to 73.6%. Shree Digvijay had a production capacity of 1.07 Mt/yr (International Cement Review, 2008b).

HeidelbergCement AG of Germany decided to merge Mysore Cements Ltd., Indorama Industries Ltd., and its 100% subsidiary HeidelbergCement India into a new entity. After the merger, HeidelbergCement would own 69% of the merged company. HeidelbergCement acquired a 54% stake in Mysore Cements in 2006. The company also acquired a 50% stake in Indorama in 2006 and the remaining 50% in 2008 (International Cement Review, 2008a).

Clay and Shale.—India has an abundance of kaolin deposits; deposits of high-quality grades occur in the State of Kerala where it has established a hub of kaolin production. English Indian Clays Ltd., which was the leading producer in Southeast

Asia, had a total production capacity of 210,000 t/yr of kaolin (180,000 t/yr of hydrous and 30,000 t/yr of calcined). The company was in the process of doubling its calcined kaolin output to 60,000 t/yr at its operation near Trivandrum in the State of Kerala; the project was scheduled to be completed by August 2008. Ashapura Minechem planned to establish a new 200,000-t/yr-capacity kaolin plant in the State of Kerala; the plant was also scheduled for completion in August 2008. The plant would produce 50,000 t/yr each of air floated, lump, hydrous, and hydrous calcined grade. The kaolin feedstock would be supplied from Ashapura's own 300,000-t/yr Mullasserri Mine and other local deposits. The company was looking for additional untapped kaolin deposits, including a 600,000-t deposit at Sasthavattam, which was located 10 to 14 kilometers (km) from the plant (Industrial Minerals, 2008a).

Diamond.—Rio Tinto plc of the United Kingdom filed a mining lease application for its Bunder diamond project in the State of Madhya Pradesh. The exploration target for diamond mineralization at the project was between 40 and 70 Mt at a grade that varied between 0.3 and 0.7 carat per metric ton. The grades were at least three times greater than the grade of the closed Panna Mine, which was India's only other hard-rock diamond mine. Rio Tinto had spent more than \$25 million during the past 6 years on diamond exploration and evaluation in India and planned to spend an additional \$30 million to support continued evaluation of the deposit. The original discovery was made in 2002 and a prospecting license was executed in September 2006. An order of magnitude study was begun to evaluate the economic viability of the eight diamondiferous lamproites and was expected to have results in September 2008. Environmental approval for a 10-t/hr dense-media separation plant was expected from the local government (Mining Engineering, 2008).

India ceased all rough diamond imports beginning on November 25 owing to the worldwide economic crisis. The gemstone industry laid off 50,000 workers, or 4% of the workforce. Gem sales fell in October and India exported 35% of its diamond goods to the United States through the transshipment center of Mumbai. The country polished the majority of all rough diamond in the world in terms of both value and volume (Antwerp Facets News Service, 2008).

Phosphate Rock.—To ensure that the demand for phosphate rock for domestic fertilizer producers was met, the Government secured agreements with Legend International Holdings Inc. of Australia and Office Chenifien des Phosphates (OCP) of Morocco. Indian Farmers Fertilizers Cooperative Ltd. and Legend reached a long-term agreement for Legend to supply a minimum of 3 Mt/yr of concentrated phosphate rock to India from its Lady Annie project in Queensland within 2 to 3 years. The cooperative operated five fertilizer plants with a combined capacity of 4.3 Mt/yr of phosphorus fertilizer and 4.2 Mt/yr of nitrogen fertilizer. The Indian Ministry of Chemicals, Fertilizer and Steel and OCP discussed investment by Indian firms to develop a joint-venture phosphoric acid project in Morocco. Zuari Industries Ltd. already had a joint-venture project with OCP to produce phosphoric acid. India imported 1.1 Mt/yr of phosphate rock from Morocco, which represented 22% of total imports (Industrial Minerals, 2008b).

Soda Ash.—India's soda ash industry has been expanding domestic capacities and securing overseas sources. Glass and detergents were the main markets, each accounting for 40% of the country's output of soda ash. Nirma Ltd. (1 Mt/yr), Tata Chemicals Ltd. (TCL) (864,000 t/yr), and Gujarat Heavy Chemicals Ltd. (GHCL) (650,000 t/yr) were the leading producers. TCL planned to expand its production capacity to 1.2 Mt/yr by 2010 at its plant at Mithapur in the State of Gujarat with an investment of \$140 million, and GHCL planned to add 250,000 t/yr to its current capacity at Sutrapada, Gujarat. In 2008, Nirma acquired Searles Valley Minerals Inc. of the United States and TCL made a bid for General Chemical Industry Products Inc., also of the United States, which owned 75% of General Chemical Soda Ash Partners. Owens-Illinois Inc. owned the remaining 25%. GHCL also aimed to acquire a company in China (Industrial Minerals, 2008j).

Talc.—Golcha Group produced talc from its Bhilwara and Dausa Mines in the State of Rajasthan, which had combined reserves of 25 Mt. The Group planned to increase its talc production by 100,000 t/yr in 2009 from the current 300,000 t/yr. Golcha Associated Group had a production capacity of 160,000 t/yr. Jai Group, which had a talc production capacity of 100,000 t/yr, planned to increase its capacity to 200,000 t/yr in the next 3 years. The company's Bharkundi I talc mine is located at Parsola, Rajasthan. In addition, the company had four smaller talc mines with capacities ranging from 5,000 t/yr to 15,000 t/yr (Industrial Minerals, 2008b).

Mineral Fuels and Related Materials

Coal.—Western Coalfields Ltd., which was a subsidiary of Coal India Ltd., planned to open 34 coal projects with a combined production capacity of 35.7 Mt/yr at a cost of \$818 million during fiscal year 2011-12. Of the 34 projects (24 open cast and 10 underground), 4 had been approved, 12 had been formulated, and the remaining 18 had yet to be formulated. Currently, there were 26 ongoing projects with a combined capacity of 18 Mt/yr at a cost of \$248 million; 5 of these projects were approved in 2008 (Coal Age, 2008).

Neyveli Lignite Corp. Ltd. (NLC) was a leading lignite mining and power company in India. NLC had three opencast lignite mines (Mine-I, Mine-IA, and Mine-II) with a combined capacity of 24 Mt/yr and three thermal powerplants with a combined capacity of 2,490 MW. About 87% of the lignite reserves in India are located in the State of Tamil Nadu. NLC had measured lignite reserves of 4,150 Mt in an area of 480 km². NLC planned to expand the production capacity of Mine-II to 15 Mt/yr from 10.5 Mt/yr. NLC also planned to develop a lignite mine at Barsingsar in the State of Rajasthan with a capacity of 2.1 Mt/yr (Neyveli Lignite Corp. Ltd., 2008).

Great Eastern Energy Corp. Ltd., which was a pioneer in the exploration and development of coalbed methane (CBM) in India, commissioned a brand new drill rig, which enabled the startup of a new CBM development program in a licensed area that covered 210 km². The company completed 23 vertical production wells and 8 core holes. The wells would be connected by an internal pipeline network to gas-gathering stations. CBM would supplement domestic supplies of gas to

help address the growing demand for gas. Demand for gas in the licensed area was estimated to be 4.3 to 5.7 million cubic meters per day, which was more than double the company's peak expected production level (Great Eastern Energy Corp. Ltd., 2008).

Natural Gas.—The \$7.6 billion 2,700-km Iran-Pakistan-India (IPI) gas pipeline would have a capacity to carry 54 billion cubic meters per year of gas; 32 billion cubic meters of gas would be supplied to India and 22 billion cubic meters would go to Pakistan. The IPI project could become an Iran-Pakistan-China project when India delayed its participation in the joint venture. The Turkmenistan-Afghanistan-Pakistan-India (TAPI) pipeline proposed in 2001 for the supply of natural gas to India would cover a distance of 1,800 km. India joined the project in April 2008. In addition to an estimated cost for the project of \$8 billion, there remained the question of whether Turkmenistan had enough natural gas to fill the pipeline. India's interest in joining the pipeline project was in opening exploration and development opportunities for Turkmenistan's gas reserves in addition to receiving gas from Turkmenistan. The TAPI project might not be realized (Petroleum Economist, 2008).

Petroleum.—The Government called for selling old oilfields to let the private sector deploy technologies that could enhance oil recovery from the fields without raising Government spending. India imported about 72% of its crude oil requirement. To reduce the dependence on oil imports, the Government was considering accelerating its exploration for oil and gas. Since 1999, the reward of 162 new areas for exploration under the New Exploration Licensing Policy had led to 46 oil and gas discoveries and added 600 Mt of oil equivalent to the country's hydrocarbon reserves (Alexander's Gas & Oil Connections, 2008a).

Uranium.—The Government planned to invest \$175 million in exploring for uranium in the States of Andhra Pradesh, Karnataka, Meghalaya, and Rajasthan because the country has limited reserves (about 80,000 t) of uranium, and its uranium production of 300 t/yr was insufficient to meet its requirement of 500 t/yr. Also, India wanted to build more nuclear powerplants to meet its rising energy demands but could not import the natural uranium required to fuel its reactors. The currently installed generating capacity of nuclear power was 3,360 MW. State-owned Uranium Corp. of India Ltd. planned to establish new mines and mills in the States of Andhra Pradesh and Meghalaya. The company operated uranium mines at Bhatin, Jaduguda, Narwapahar, and Turamdih in the State of Jharkhand and a processing mill at Jaduguda. The Government could soon allow the private sector in the area of uranium exploration and mining (Minesite.com, 2008).

Reserves and Resources

The country's mineral resources include large deposits of barite, bauxite, chromium, coal, iron ore, limestone, and manganese. Barite deposits occur in the State of Andhra Pradesh. Iron ore deposits in the form of hematite and magnetite occur in the States of Bihar, Karnataka, Madhya Pradesh, Orissa, and Tamil Nadu. India's coal resources amounted to 250 Gt and are located in the States of Andhra Pradesh,

Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Orissa, and West Bengal. Its lignite reserves total 38 Gt and are found in the States of Gujarat, Jammu and Kashmir, Kerala, Rajasthan, and Tamil Nadu (table 3).

Outlook

It is expected that India will need major investment in its mineral industry in the next 5 to 10 years to support and sustain its high rate of economic growth. The key mining segments for investment include coal, metallic ores, and mining equipment. The value of mineral industry output is expected to reach \$30 billion and to account for 2.5% of the GDP within the next 4 years. India's need for energy (particularly coal) is expected to continue to encourage the modernization of its mining sector, and to result in more productive and environmentally sustainable mines. The country's production of bauxite, alumina, and aluminum is expected to increase owing to new mines and plants and expansions of production capacities. The country is likely to achieve a crude steel production capacity of 124 Mt/yr in fiscal year 2011-12 with the startup of new steel plants and the completion of expansion projects, such as those planned by ArcelorMittal, POSCO, and MSP Steel. India has abundant heavy mineral sands. Production of monazite, titanium minerals, and zircon are all expected to increase. The country is expected to become a significant producer of rare earths in the next few years. Owing to mergers and capacity additions, India's output of cement is expected to reach 335 Mt/yr in 5 years.

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

(Metric tons unless otherwise specified)

Commodity ³	2004	2005	2006	2007	2008	
METALS						
Aluminum:						
Bauxite, gross weight	thousand metric tons	11,285 ⁴	12,385 ⁴	13,940 ⁴	20,343 ^{r,4}	21,210 ⁴
Alumina, Al ₂ O ₃ equivalent	do.	2,600	2,700	2,800	2,900	3,000
Metal, primary		860,900 ^{r,4}	942,400 ⁴	1,105,100 ^{r,4}	1,221,800 ^{r,4}	1,307,500 ⁴
Cadmium metal		489 ⁴	409 ⁴	457 ⁴	580 ⁴	599 ⁴
Chromium, chromite, gross weight		2,948,944 ⁴	3,255,162 ⁴	3,600,400 ⁴	3,320,000 ⁴	3,900,000 ⁴
Cobalt metal		545 ⁴	1,220 ⁴	1,184 ⁴	980 ⁴	858 ⁴
Copper:						
Mine output, Cu content		29,500 ⁴	26,900 ⁴	27,400 ⁴	33,900 ^{r,4}	30,600 ⁴
Metal, primary:						
Smelter		401,000 ⁴	486,600 ⁴	610,000 ⁴	500,400 ⁴	643,800 ⁴
Refinery:						
Electrolytic, cathode		399,000 ⁴	477,000 ^{r,4}	614,000 ^{r,4}	713,600 ^{r,4}	669,200 ⁴
Fire refined		20,000	20,000	15,000	15,000	15,000
Total		419,000	497,000 ^r	629,000 ^r	729,000 ^r	684,000
Gold metal, smelter	kilograms	3,700 ⁴	3,100 ⁴	2,400 ⁴	3,000 ⁴	2,700 ⁴
Iron and steel:						
Iron ore and concentrate:						
Gross weight	thousand metric tons	120,600 ⁴	152,000 ⁴	177,000 ⁴	207,000 ^{r,4}	220,000 ⁴
Fe content	do.	77,200 ⁴	97,500 ⁴	113,000 ⁴	126,000 ^{r,4}	141,000 ⁴
Metal:						
Pig iron	do.	25,117 ⁴	27,125 ⁴	28,300 ⁴	28,800 ⁴	29,000 ⁴
Direct-reduced iron	do.	9,370 ⁴	12,040 ⁴	14,740 ⁴	18,100 ⁴	20,200 ⁴
Ferroalloys:						
Ferrochromium, including charge chrome		527,100 ⁴	611,373 ⁴	634,200 ⁴	820,000 ^{r,4}	750,000 ⁴
Ferrochromiumsilicon		10,000	10,000	10,000	10,000	10,000
Ferromanganese		204,800 ^{r,4}	192,900 ^{r,4}	180,000	180,000	170,000
Ferrosilicon		55,000	56,000	58,000	60,000	62,000
Silicomanganese		96,893 ^{r,4}	69,224 ^{r,4}	80,000 ^r	80,000 ^r	90,000
Other		9,000	9,000	9,000	9,000	9,000
Steel, crude	thousand metric tons	32,600 ⁴	45,800 ⁴	49,500 ⁴	53,100 ⁴	55,200 ⁴
Semimanufactures ⁵	do.	38,421 ⁴	42,947 ⁴	45,000	47,000	49,000
Lead:						
Mine output, Pb content		51,300 ⁴	60,400 ⁴	69,200 ⁴	77,500 ^{r,4}	87,300 ⁴
Metal, refined:						
Primary		40,000 ⁴	56,000 ⁴	49,600 ^{r,4}	53,800 ^{r,4}	62,000 ⁴
Secondary		25,000 ⁴	35,000 ⁴	55,600 ^{r,4}	70,000 ^{r,4}	76,000 ⁴
Total		65,000 ⁴	91,000 ⁴	105,200 ^{r,4}	123,800 ⁴	138,000 ⁴
Manganese:						
Ore and concentrate, gross weight	thousand metric tons	1,776 ⁴	2,386 ⁴	2,084 ^{r,4}	2,300	2,400
Mn content	do.	630	927 ⁴	844 ^{r,4}	900	960
Rare-earth metals, monazite concentrate, gross weight		5,000	5,000	5,000	5,000	5,000
Selenium	kilograms	12,000	13,000	13,000	14,000	14,000
Silver, mine and smelter output	do.	14,500 ⁴	31,500 ⁴	30,900 ⁴	82,300 ^{r,4}	96,000 ⁴
Titanium mineral concentrates, gross weight:						
Ilmenite		621,000	686,000	690,000	700,000	720,000
Rutile		19,600	20,100	21,000	21,000	21,000
Zinc:						
Mine output, concentrate:						
Gross weight		340,000 ^{r,4}	447,100 ^{r,4}	501,700 ^{r,4}	538,900 ^{r,4}	613,600 ⁴
Zn content		191,000	262,000	294,000	314,000	337,000

See footnotes at end of table.

TABLE 1—Continued
INDIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES^{1,2}

(Metric tons unless otherwise specified)

Commodity ³	2004	2005	2006	2007	2008
METALS—Continued					
Zinc—Continued:					
Metal:					
Primary	238,400 ⁴	266,200 ⁴	420,900 ⁴	430,800 ^{r,4}	545,800 ⁴
Secondary	24,000	23,000	23,000	23,000	22,000
Total	262,000	289,000	444,000	454,000 ^r	568,000
Zirconium concentrate, zircon, gross weight	25,400	26,700	28,000	29,000	30,000
INDUSTRIAL MINERALS					
Abrasives, natural, n.e.s. ⁶					
Corundum, natural kilograms	1,100	1,100	1,000	1,000	1,000
Garnet	125,000	120,000	115,000	120,000	125,000
Jasper	8,500	8,700	8,800	9,000	8,900
Asbestos	18,000	19,000	20,000	21,000	20,000
Barite	1,100,000	1,200,000	950,000	1,000,000	1,100,000
Bromine, elemental	1,500	1,500	1,500	1,500	1,500
Cement, hydraulic thousand metric tons	130,000	145,000	160,000	170,000	180,000
Chalk	115,000	120,000	120,000	125,000	125,000
Clays:					
Ball clay	400,000	420,000	420,000	430,000	430,000
Diaspore	11,000	11,000	10,000	10,000	10,000
Fireclay	365,000	370,000	375,000	380,000	390,000
Kaolin:					
Salable crude thousand metric tons	550	560	560	570	570
Processed do.	180	190	200	200	210
Total do.	730	750	760	770	780
Other do.	75	80	80	85	85
Diamond:					
Gem thousand carats	16	16	15	15	15
Industrial do.	43	42	40	40	38
Total do.	59	58	55	55	53
Feldspar	367,346 ^{r,4}	414,637 ^{r,4}	386,685 ^{r,4}	397,328 ^{r,4}	400,000
Fluorspar:					
Concentrates, metallurgical-grade	6,400	6,500	5,800	5,000	5,500
Other fluorspar materials, graded	4,300	4,400	500	1,000	1,500
Gemstones, excluding diamond:					
Agate, including chalcedony pebble	200	180	180	170	160
Garnet kilograms	850	850	800	800	800
Graphite ⁷	120,000	130,000	120,000	130,000	140,000
Gypsum	2,350,000	2,400,000	2,450,000	2,500,000	2,550,000
Kyanite and related materials:					
Kyanite	6,200	6,800	7,000	7,300	7,500
Sillimanite	14,500	15,000	15,000	15,200	16,000
Lime	900,000	920,000	910,000	900,000	910,000
Magnesite	370,000	380,000	370,000	360,000	350,000
Mica:					
Crude	1,600	1,600	1,700	1,700	1,700
Scrap and waste	2,100	2,100	2,200	2,200	2,300
Total	3,700	3,700	3,900	3,900	4,000
Nitrogen, N content of ammonia thousand metric tons	10,718 ⁴	10,800	10,900	11,000	11,100
Phosphate rock, including apatite	1,180,000	1,200,000	1,200,000	1,210,000	1,220,000
Pigments, mineral, natural, ocher	360,000	360,000	370,000	375,000	380,000
Pyrites, gross weight	120,000	130,000	125,000	120,000	120,000

See footnotes at end of table.

TABLE 1—Continued
INDIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES^{1,2}

(Metric tons unless otherwise specified)

Commodity ³	2004	2005	2006	2007	2008
INDUSTRIAL MINERALS—Continued					
Salt:					
Rock salt	thousand metric tons	3	3	3	3
Other	do.	15,000	15,500	15,500	16,000
Total	do.	15,000	15,500	15,500	16,000
Sand:					
Calcareous	do.	255	260	265	275
Silica	do.	1,500	1,600	1,600	1,700
Other	do.	3,000	3,100	3,200	3,200
Slate		11,000	12,000	12,500	13,000
Soda ash		1,500,000	1,500,000	1,500,000	1,500,000
Stone, sand and gravel:					
Calcite		52,000	53,000	54,000	55,000
Dolomite	thousand metric tons	3,000	3,000	3,000	3,100
Limestone	do.	125,000	120,000	123,000	125,000
Quartz and quartzite	do.	260	270	270	280
Sulfur, byproduct from fertilizer plants		12,000	13,000	14,000	15,000
Talc and related materials:					
Pyrophyllite		86,000	85,000	86,000	87,000
Steatite, soapstone		550,000	545,000	560,000	555,000
Vermiculite		4,400	4,500	4,600	4,700
Wollastonite		115,000	120,000	125,000	120,000
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous	thousand metric tons	330,000	333,000	350,000	380,000
Lignite	do.	25,000	27,000	26,000	25,000
Total	do.	355,000	360,000	376,000	405,000
Gas, natural:					
Gross	million cubic meters	28,000	29,000	30,000	32,407 ^{r,4}
Marketable	do.	26,000	27,000	28,000	27,069 ^{r,4}
Petroleum:					
Crude	thousand 42-gallon barrels	244,000	248,000	250,000	254,000 ^{r,4}
Refinery products:					
Liquefied petroleum gas	do.	44,000	45,000	45,000	49,000 ^{r,4}
Gasoline	do.	70,000 ^r	75,000 ^r	85,000 ^r	101,000 ^{r,4}
Kerosene and jet fuel	do.	110,000 ^r	115,000 ^r	120,000 ^r	127,000 ^{r,4}
Distillate fuel oil	do.	370,000 ^r	380,000 ^r	400,000 ^r	432,000 ^{r,4}
Residual fuel oil	do.	71,000	85,000 ^r	100,000 ^r	117,000 ^{r,4}
Other	do.	325,000 ^r	335,000 ^r	340,000 ^r	330,000 ^{r,4}
Total	do.	990,000 ^r	1,040,000 ^r	1,090,000 ^r	1,156,000 ^{r,4}

^rRevised. do. Ditto.

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

²Table includes data available through October 19, 2009.

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

⁴Reported figure.

⁵Excludes production from steel miniplants.

⁶Not elsewhere specified.

⁷India's marketable production is 10% to 20% of mine production.

TABLE 2
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(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. (Indian Government, 100%)	Dhamanjodi refinery, Orissa	1,580
Do.	Bharat Aluminium Co. Ltd. [Indian Government, 49%, and Sterlite Industries (India) Ltd., 51%]	Korba refinery, Chhattisgarh	200
Do.	Utkal Alumina International Ltd. (Hindalco Industries Ltd., 100%)	Koraput refinery, Orissa	1,500 ¹
Do.	Madras Aluminium Co. Ltd. [Sterlite Industries (India) Ltd., 80%, and others, 20%]	Mettur refinery, Tamil Nadu	80
Do.	Indian Aluminium Co. Ltd. [Indian interests, 60.4%, and Alcan Aluminium Ltd., 39.6%]	Muri refinery, Jharkhand	88
Do.	Hindalco Industries Ltd. (Birla Group, 33%; foreign investors, 26%; private Indian investors, 23%; financial institutions, 18%)	Renukoot refinery, Uttar Pradesh	450
Aluminum	Indian Aluminium Co. Ltd. [Indian interests, 60.4%, and Alcan Aluminium Ltd., 39.6%]	Alupuram smelter, Kerala	20
Do.	National Aluminium Co. Ltd. (Indian Government, 100%)	Angul smelter, Orissa	345
Do.	Indian Aluminium Co. Ltd. [Indian interests, 60.4%, and Alcan Aluminium Ltd., 39.6%]	Belgaum smelter, Karnataka	70
Do.	Hindalco Industries Ltd. (Birla Group, 33%; foreign investors, 26%; private Indian investors, 23%; financial institutions, 18%)	Hirakud smelter, Orissa	100
Do.	Bharat Aluminium Co. Ltd. [Indian Government, 49%, and Sterlite Industries (India) Ltd., 51%]	Korba smelters, Chhattisgarh	350
Do.	Madras Aluminium Co. Ltd. [Sterlite Industries (India) Ltd., 80%, and others, 20%]	Mettur smelter, Tamil Nadu	40
Do.	Hindalco Industries Ltd. (Birla Group, 33%; foreign investors, 26%; private Indian investors, 23%; financial institutions, 18%)	Renukoot smelter, Uttar Pradesh	275
Barite	Andhra Pradesh Mineral Development Corp. Ltd. (Andhra Pradesh State government, 100%)	Cuddapah District mines, Andhra Pradesh	350
Do.	Associated Mineral Corp.	do.	75
Do.	Pragathi Minerals	do.	50
Do.	Shri C.M. Ram nath Reddy	do.	75
Do.	Vijayalaxmi Minerals Trading Co.	do.	50
Bauxite	Bharat Aluminium Co. Ltd. [Indian 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. (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. (Indian Government, 100%)	Mines in Panchpatmali Hills, Koraput District, Orissa	4,800
Do.	Minerals & Minerals Ltd. (Indian Government, 100%)	Mines in Richuguta, Palamau District, Jharkhand	200
Borax	Borax Morarji Ltd.	Ambarnath, Maharashtra	17
Cement	Larsen and Toubro Ltd.	Awarpur plant, Maharashtra	2,300
Do.	Century Cement (Century Textiles and Industries Ltd., a subsidiary of the Birla Group, 100%)	Baikunth plant, Madhya Pradesh	1,120
Do.	Ambuja Cements Ltd. (Holcim Group, 14.8%)	Plants in 7 States	14,000

See footnotes at end of table.

TABLE 2—Continued
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c	
Cement—Continued	Coromandel Fertilizers Ltd. [Chevron Chemical Co. (United States), 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.	The Associated Cement Cos. Ltd. (Indian Government, 34.86%, and private shareholders, 65.14%)	Gagal plant, Himachal Pradesh	1,830	
Do.	Raymond Cement Works (a division of Raymond Woolen Mills Ltd., JK Singhania, principal shareholder)	Gopalnagar plant, West Bengal	1,250	
Do.	Narmada Cement Co. Ltd. (Chowgule and Co. Ltd., 34%; Gujarat State government, 17.33%; others, 48.67%)	Jafrabad plant, Gujarat	1,000	
Do.	Rajashree Cement (a division of Indian Rayon and Industries Ltd., 100%)	Khor plant, Karnataka	1,020	
Do.	The Associated Cement Cos. Ltd. (Indian Government, 34.86%, and private shareholders, 65.14%)	Kymore plant, Madhya Pradesh	1,500	
Do.	Mangalam Cement Ltd.	Morak plant, Rajasthan	1,000	
Do.	Mysore Cements Ltd. (Government institutions and banks, 41.13%; Corporate Trust Holdings, 21.70%; others, 37.17%)	Narasingarh plant, Haryana	1,089	
Do.	Cement Corp. of India Ltd. (Indian Government, 100%)	Nayagaon plant, Madhya Pradesh	1,330	
Do.	JK Cement Works (a division of JK Synthetics Ltd., 100%)	Nimbahera plant, Rajasthan	1,462	
Do.	OCL India Ltd.	Orissa	1,850	
Do.	The India Cement Co. Ltd. (Indian Government, 26%; Life Insurance Corp. of India, 24%; others, 50%)	Sankarnagar plant, Tamil Nadu	1,000	
Do.	Maihar Cement (Century Textiles and Industries Ltd., a subsidiary of the Birla Group, 100%)	Satna plant, Madhya Pradesh	1,800	
Do.	Shree Digvijay Cement Co. Ltd.	Shreeniwas plant, Maharashtra	1,070	
Do.	Lakshmi Cement (a division of Straw Products Ltd., JK Singhania, principal shareholder)	Sirohi plant, Rajasthan	1,400	
Do.	Lafarge S.A.	Sonadih, Chhattisgarh	1,400	
Do.	Manikgarh Cement (Century Textiles and Industries Ltd., a subsidiary of the Birla Group, 100%)	Tehsil Rajura plant, Maharashtra	1,000	
Do.	Vasavadatta Cement (Kesoram Industries Ltd., 100%)	Vasavadatta plant, Karnataka	1,000	
Do.	Vikram Cement (Grasim Industries Ltd., a subsidiary of the 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.	The Associated Cement Cos. Ltd. (Indian Government, 34.86%, and private shareholders, 65.14%)	Wadi plant, Karnataka	2,180	
Chromium	Ferro Alloys Corp. Ltd.	Cuttack District, Orissa	120	
Do.	Orissa Mining Corp. Ltd. (Orissa Industries Ltd., 100%)	do.	300	
Do.	Tata Steel	do.	100	
Do.	Ferro Alloys Corp. Ltd.	Dhenkanal District, Orissa	75	
Do.	Orissa Mining Corp. Ltd. (Orissa Industries Ltd., 100%)	do.	200	
Do.	Mysore Minerals Ltd.	Hassan District, Karnataka	125	
Do.	Ferro Alloys Corp. Ltd.	Kendujhar District, Orissa	75	
Do.	Orissa Mining Corp. Ltd. (Orissa Industries Ltd., 100%)	do.	100	
Do.	Ferro Alloys Corp. Ltd.	Khammam District, Andhra Pradesh	100	
Coal, bituminous	million metric tons	Bharat Coking Coal Ltd. (a subsidiary of Coal India Ltd., Indian Government, 100%)	Bihar and West Bengal	26
Do.	do.	Central Coalfields Ltd. (a subsidiary of Coal India Ltd., Indian Government, 100%)	Bihar	27
Do.	do.	Eastern Coalfields Ltd. (a subsidiary of Coal India Ltd., Indian Government, 100%)	Bihar and West Bengal	21
Do.	do.	Mahanadi Coalfields Ltd. (a subsidiary of Coal India Ltd., Indian Government, 100%)	Orissa	21

See footnotes at end of table.

TABLE 2—Continued
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Coal, bituminous— million metric tons		North Eastern Coalfields Ltd. [a subsidiary of Coal India Ltd. (Indian Government, 100%)]	Assam	640
Continued				
Do.	do.	Northern Coalfields Ltd. [a subsidiary of Coal India Ltd. (Indian Government, 100%)]	Madhya Pradesh and Uttar Pradesh	24
Do.	do.	Singareni Collieries Co. Ltd. (Andhra Pradesh State government, 50%, and Indian Government, 50%)	Andhra Pradesh	18
Do.	do.	South Eastern Coalfields Ltd. [a subsidiary of Coal India Ltd. (Indian Government, 100%)]	Madhya Pradesh	36
Do.	do.	Western Coalfields Ltd. (a subsidiary of Coal India Ltd., Indian Government, 100%)	Madhya Pradesh and Maharashtra	18
Coal, lignite	do.	Neyveli Lignite Corp. Ltd. (NLC) (Indian Government, 100%)	Tamil Nadu	17
Copper, mine		Hindustan Copper Ltd. (HCL) (Indian Government, 100%)	Indian Copper Complex Mines, Ghatsila District, Jharkhand	31
Do.	do.		Khetri Copper Complex Mines, Khetrinagar Rajasthan	15
Do.	do.		Malanjkhand Copper Complex Mines, Balaghar District, Madhya Pradesh	22
Copper, metal		Hindalco Industries Ltd. (Birla Group, 33%; foreign investors, 26%; private Indian investors, 23%; financial institutions, 18%)	Birla Copper Complex smelter, Dahej, Gujarat	70
Do.		Hindustan Copper Ltd. (HCL) (Indian Government, 100%)	Indian Copper Complex smelter-refinery, Ghatsila District, Jharkhand	20
Do.	do.		Khetri Copper Complex smelter-refinery, Khetrinagar District, Rajasthan	45
Do.		Sterlite Industries (India) Ltd.	Tuticorin smelter, Tamil Nadu	400
Do.	do.		Silvassa refinery, Gujarat	300
Diamond	carats	Indian Government	Mahjgawan Mine	25,000
Gold	kilograms	Hutti Gold Mines Co.	Hutti Mine, Karnataka	3,000
Iron and steel, crude steel		Visvesvaraya Iron and Steel Ltd. [Karnataka State government, 60%, and Steel Authority of India Ltd. (Indian Government, 100%), 40%]	Bhadravati steel plant, Karnataka	180
Do.		Steel Authority of India Ltd. (Indian Government, 100%)	Bhilai steel plant, Jharkhand	4,930
Do.		do.	Bokaro steel plant, Jharkhand	4,600
Do.		Indian Iron and Steel Co. Ltd. [wholly owned subsidiary of Steel Authority of India Ltd. (Indian Government, 100%)]	Burnpur steel plant, West Bengal	1,500
Do.		Ispat Industries Ltd.	Dolvi, Maharashtra	3,000
Do.		Steel Authority of India Ltd. (Indian Government, 100%)	Durgapur steel plant, West Bengal	1,600
Do.		Tata Steel	Jamshedpur steel plant, Jharkhand	5,000
Do.		do.	Jagdarpur, Chattisgarh	2,000
Do.		do.	Duburi, Orissa	3,000
Do.		Steel Authority of India Ltd. (Indian Government, 100%)	Rourkela steel plant, Orissa	1,800
Do.		Rashtriya Ispat Nigam Ltd.	Visakhapatnam steel plant, Andhra Pradesh	3,200
Do.		JSW Steel Co. Ltd.	Vijayanagar, Karnataka	7,000
Do.		Ministeel plants (privately owned)	About 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) (Indian Government, 100%)	Bailadila, Chhattisgarh	9,000
Do.		Steel Authority of India Ltd. (Indian Government, 100%)	Bastar and Durg District, Chhattisgarh	7,000
Do.		Kudremukh Iron Ore Co. Ltd. (Indian Government, 100%)	Kudremukh, Chikmagalur District, Karnataka	10,300

See footnotes at end of table.

TABLE 2—Continued
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Iron ore—Continued	National Mineral Development Corp. Ltd. (NMDC) (Indian 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. (Indian Government, 100%)	Kendujhar District, Orissa	3,000
Do.	Tata Steel	do.	2,000
Do.	Indian Iron and Steel Co. Ltd. [wholly owned subsidiary of Steel Authority of India Ltd. (Indian Government, 100%)]	Singhbhum District, Bihar	2,500
Do.	Steel Authority of India Ltd. (Indian Government, 100%)	do.	3,500
Do.	Tata Steel	do.	3,500
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) (Indian Government, 100%)	do.	22
Lead:			
Primary	Hindustan Zinc Ltd. (HZL) (Sterlite Opportunities and Ventures Ltd., 64.9%, and Indian Government, 29.5%)	Chanderiya smelters, Rajasthan	85
Do.	do.	Tundoo smelter, Bihar	8
Secondary	Indian Lead Co.	Thane refinery, Mumbai, Maharashtra	25
Do.	do.	Wada, Mumbai, Maharashtra	40
Lead ore	Hindustan Zinc Ltd. (HZL) (Sterlite Opportunities and Ventures Ltd., 64.9%, and Indian Government, 29.5%)	Agnigundala Mine, Andhra Pradesh	72
Do.	do.	Sargipalli Mine, Orissa	150
Lead-zinc ore	do.	Rampura-Agucha Mine, Rajasthan	1,300
Do.	do.	Zawar mine group, Rajasthan	1,200
Magnesite	Burn Standard Co. Ltd. (Indian Government, 100%)	Salem, Tamil Nadu	150
Do.	Dalmia Magnesite Corp.	do.	150
Do.	Tamil Nadu Magnesite Ltd. (Tamil Nadu State government, 100%)	do.	150
Manganese ore ²	Manganese Ore India Ltd. (Indian Government, 100%)	Adilabad, Andhra Pradesh	NA
Do.	Falechand Marsingdas	Andhra Pradesh	NA
Do.	Manganese Ore India Ltd. (Indian Government, 100%)	Balaghat, Madhya Pradesh	NA
Do.	J.A. Trivedi Bros.	do.	NA
Do.	Sandur Manganese and Iron Ores Ltd.	Bellary, Karnataka	NA
Do.	Manganese Ore India Ltd. (Indian Government, 100%)	Bhandara, Maharashtra	NA
Do.	Eastern Mining Co.	North Kanara, Karnataka	NA
Do.	Mysore Minerals Ltd.	do.	NA
Do.	Manganese Ore India Ltd. (Indian Government, 100%)	Keonjhar, Orissa	NA
Do.	Mangilah, Rungta (Pvt.) Ltd.	do.	NA
Do.	Orissa Mining Corp. Ltd.	do.	NA
Do.	Rungta Mines (Pvt.) Ltd.	do.	NA
Do.	Serajuddin & Co.	do.	NA
Do.	S. Lall & Co.	do.	NA
Do.	Tata Steel	do.	NA
Do.	Orissa Mineral Development Co. Ltd.	Koraput, Orissa	NA
Do.	Orissa Mining Corp. Ltd.	do.	NA
Do.	Mysore Minerals Ltd.	Shimoga, Karnataka	NA
Do.	Aryan Mining & Trading Corp.	Sundargarh, Orissa	NA
Do.	Orissa Manganese & Minerals (Pvt.) Ltd.	do.	NA
Do.	Tata Steel	do.	NA
Do.	R.B.S. Shreeram Durga Prasad and Falechand Marsingdas	Vizianagaram, Andhra Pradesh	NA

See footnotes at end of table.

TABLE 2—Continued
INDIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2008

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Mica	metric tons	Micafab India Pvt. Ltd.	Sydapuram Mandal, Andhra Pradesh	4,500
Do.	do.	Premier Mica Co.	Rjupalem, Andhra Pradesh	200
Petroleum, refined products	thousand 42-gallon barrels per day	Cochin Refineries Ltd. [a subsidiary of Oil and Natural Gas Corp. (Indian Government, 55%, and private interests, 45%)]	Ambalamugal refinery, Kerala	93,000
Do.	do.	Indian Oil Corp. (a subsidiary of Oil and Natural Gas Corp. (Indian Government, 91%, and private interests, 9%)]	Barauni refinery, Bihar	66,000
Do.	do.	Bongaigaon Refinery and Petrochemicals Ltd. [a subsidiary of Oil and Natural Gas Corp. (Indian Government, 100%)]	Bongaigaon refinery, Assam	27,000
Do.	do.	Indian Oil Corp. [a subsidiary of Oil and Natural Gas Corp. (Indian Government, 91%, and private interests, 9%)]	Digboi refinery, Assam	12,000
Do.	do.	do.	Guwahati refinery, Assam	20,000
Do.	do.	do.	Haldia refinery, West Bengal	61,000
Do.	do.	do.	Koyali refinery, Gujarat	185,000
Do.	do.	Madras Refineries Ltd. [a subsidiary of Oil and Natural Gas Corp. (Indian Government, 52%, and private interests, 48%)]	Madras refinery, Tamil Nadu	131,000
Do.	do.	Bharat Petroleum Corp. Ltd. [a subsidiary of Oil and Natural Gas Corp. (Indian Government, 67%, and private interests, 33%)]	Mahul refinery, Mumbai, Maharashtra	135,000
Do.	do.	Industan Petroleum Corp. Ltd. [a subsidiary of Oil and Natural Gas Corp. (Indian Government, 51%, and private interests, 49%)]	do.	110,000
Do.	do.	Essar Oil Ltd.	Vadinar refinery, Gujarat	240,000
Do.	do.	do.	Visakhapatnam refinery, Andhra Pradesh	90,000
Do.	do.	Indian Oil Corp. [a subsidiary of Oil and Natural Gas Corp. (Indian Government, 91%, and private interests, 9%)]	Mathura refinery, Uttar Pradesh	156,000
Do.	do.	do.	Panipat refinery, Haryana	240,000
Phosphate rock ³		Rajasthan State Mineral Development Corp. Ltd. (Rajasthan State government, 100%)	Badgaon, Dakankotra, Kanpur, Kharbaria-ka-Guda, and Sallopat Mines, Rajasthan	NA
Do.		Pyrites Phosphates and Chemicals Ltd.	Durmala and Maldeota underground mines, Uttar Pradesh	NA
Do.		Madhya Pradesh State Mining Corp. Ltd. (Madhya Pradesh State government, 100%)	Hirapur and Khatamba Mines, Jharkhand	NA
Do.		Rajasthan State Mines and Minerals Ltd. (Rajasthan State government, 100%)	Jhamarkotra Mine, Rajasthan	NA
Do.		Hindustan Zinc Ltd. (HZL) (Sterlite Opportunities and Ventures Ltd., 64.9%, and Indian Government, 29.5%)	Maton Mine, Rajasthan	NA
Titanium, ilmenite-rutile ore		Kerala Minerals and Metals Ltd. (Kerala State government, 100%)	Chavara, Kerala	100
Do.		Indian Rare Earths Ltd. (IREL) (Indian Government, 100%)	do.	250
Do.		do.	Ganjam, Orissa	220
Do.		do.	Manavalakurichi, Tamil Nadu	65
Do.		VV Minerals Ltd.	Kanyakumari, Tamil Nadu	130
Zinc		Binani Zinc Ltd.	Binanipuram smelter, Kerala	38
Do.		Hindustan Zinc Ltd. (HZL) (Sterlite Opportunities and Ventures Ltd., 64.9%, and Indian Government, 29.5%)	Chanderiya smelter, Rajasthan	340
Do.		do.	Debari smelter, Rajasthan	78
Do.		do.	Visakhapatnam (Vizag) smelter, Andhra Pradesh	54

^cEstimated. Do., do. Ditto. NA Not available.

¹Scheduled startup is delayed to 2011.

²Capacity of clusters of surface mines varies extremely, depending on demand. Estimated total capacity is 1.8 million metric tons per year (Mt/yr).

³Estimated total phosphate rock capacity is 1.2 Mt/yr.

TABLE 3
INDIA: ESTIMATED RESERVES OF MAJOR MINERAL COMMODITIES IN 2008

(Thousand metric tons unless otherwise specified)

Commodity	Reserves
Barite	32,000
Bauxite	539,000
Chromium, in ore	31,000
Coal:	
Bituminous	96,000,000
Lignite	38,000,000
Copper, in ore	135,000
Gold, in metal	67,000
kilograms	
Graphite	5,200
Ilmenite and rutile	193,000
Iron, in ore	4,900,000
Kyanite and sillimanite	1,380
Lead and zinc, in ore	63,000
Limestone	7,500,000
Magnesite	21,000
Manganese, in ore	77,000
Phosphate rock	6,100
Talc and pyrophyllite	74,600
Zircon	28,000

Source: Indian Minerals Yearbook 2007, Indian Bureau of Mines.

