



# 2006 Minerals Yearbook

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## PAKISTAN

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# THE MINERAL INDUSTRY OF PAKISTAN

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Pakistan's economy in 2006 was dominated by the service, industry, and agriculture sectors, which accounted for 52%, 26%, and 22% of the gross domestic product (GDP), respectively. Industrial production grew at a rate of 6%. The country is rich in some mineral resources, such as coal, copper, iron ore, limestone, and salt, which had yet to be explored and mined by either domestic or foreign investors. The major obstacle to investment was inadequate infrastructure. The mineral industry's contribution to the country's overall industrial output was not significant. Pakistan was reported to have an estimated 27 billion barrels of oil reserves and 7.9 trillion cubic meters of gas reserves. Oil production was limited and not sufficient to meet domestic demand. Output of mineral fuels accounted for only 1% of the GDP. In addition, the country was known to have an estimated 400 million metric tons (Mt) of iron ore in Balochistan and Northwest Frontier Provinces.

## Minerals in the National Economy

Mineral production, in terms of value, contributed less than 1% of the GDP. Employment in the mineral industry accounted for 1.5% of the labor force. The values of mineral exports and imports were equal to 6% and 30% of the values of total exports and imports, respectively.

## Production

The largest component of the manufacturing sector was the cement industry, which used easily mined indigenous limestone. Other minerals that were mined included antimony, aragonite, barite, celestite, chromite, gypsum, marble, and salt. The country also produced small amounts of oil but possessed some very large natural gas fields at Sui and Mari (table 1).

## Structure of the Mineral Industry

State-owned companies dominated in the production of gas and small amounts of oil. The Ministry of Petroleum and Natural Resources is primarily responsible for the exploration and production of hydrocarbons through Oil and Gas Development Co. Ltd. and for the transmission and distribution of natural gas through Sui Northern Gas Pipelines Ltd. and Sui Southern Gas Co. Ltd. The Ministry's mineral department explores, plans, develops, and operates mining ventures through Lakhra Coal Development Corp., Pakistan Mineral Development Corp., and Saindak Metals Ltd. Private companies are allowed to own, produce, and market nonfuel minerals (table 2).

## Commodity Review

### Metals

**Copper.**—In 2006, the government of the Province of Balochistan approved the transfer of BHP Billiton Ltd. of

Australia's interest in exploration license numbers 5, 6, and 8, which are situated in the Chagai Hills region, to Tethyan Copper Co. Ltd. The area includes the Western Porphyries copper-gold deposit and other mineralized porphyry systems located within the Reko Diq geologic complex. Tethyan Copper spent \$30 million and drilled a total of 75,000 meters to prove the reserves. In subsequent development, Tethyan Copper was taken over in 2006 by Antofagasta plc of Chile and Barrick Gold Corp. of Canada for \$130 million on a 50-50 basis. The Balochistan government would retain a 25% stake in the Reko Diq project. The Reko Diq mineralized area was estimated to contain 2,000 Mt of copper and 622,000 kilograms of gold. The project plan called for production of 200,000 metric tons per year of copper and 12,500 kilograms per year of gold. The project would require a \$1 billion investment to start commercial production by 2010 (Tethyan Copper Co. Ltd., 2006).

**Iron Ore.**—Iron ore deposits were mostly of poor quality. The most extensive known deposits were found in the Kalabagh region in western Punjab Province. Small reserves of high-grade iron ore were identified in the Chilghazi and the Chitral areas in northwestern Balochistan Province and in Northwest Frontier Province. Low-grade iron ore reserves were found at Hazara also in Northwest Frontier Province.

### Industrial Minerals

**Cement.**—Pakistan Cement Co. (PCC), which was a subsidiary of Orascom Construction Industries (OCI) of Egypt, began cement and clinker production at its 2.2-million-metric-ton-per-year (Mt/yr) new plant in the Province of Punjab. The greenfield cement plant was supplied by F.L. Smidth & Co. of Denmark. The total investment cost for the plant was \$177 million. OCI owned 62.75% of the outstanding shares in PCC. Cement demand continued to grow rapidly owing to the strong growth in the GDP (Orascom Construction Industries, 2006).

### Mineral Fuels

**Coal.**—Coal mining was one of the country's oldest industries. Coal quality was poor and the mines were operated below capacity owing to low demand. The Tharparkar District in the Province of Sindh was discovered by Sindh Coal Authority to contain 1,750 Mt of low-ash, low-sulfur lignite. This discovery placed Pakistan as the sixth richest country in the world with respect to coal resources. A feasibility study for the construction of a 1,000-megawatt (MW) coal-fired powerplant near the Thar coal mines was carried out by the Government and construction work was begun. The Government also began construction of a 300-MW powerplant in the Thatta District and a 150-MW powerplant in the Jamshoro District (Daily Times, 2007).

**Natural Gas.**—BHP Petroleum (Pakistan) Pty Ltd. awarded ABB Lummus Global a contract for the phase 2 development of the Zamzama gas condensate project located on the Dadu block in Sindh. ABB would provide key plant components and

the basic engineering of the cryogenic nitrogen removal system. This phase of the project, which was due for completion in the third quarter of 2007, would add an additional 4.2 million cubic meters per day of gas production capacity to the existing facilities (Hydrocarbon Engineering, 2006).

The Government approved a liquefied natural gas (LNG) policy that would allow infrastructure to be built for the import and storage of LNG and the regasification, distribution, and sale of the regasified gas on the domestic market. The private sector would be given tax and import duty relief for 10 years when setting up onshore or offshore LNG terminals that would result in the regasification of LNG at port or onboard LNG vessels. The Government planned to fill an immediate gas shortfall through LNG imports for the period up to 2010-11. The Government also approved a project by state-owned Sui Southern Gas Co. Ltd. for a 2.5- to 4-Mt/yr LNG import/regasification terminal in the vicinity of Karachi. The Government issued a "no objection certificate" to Associated Group of Pakistan to build a \$50 million facility near Karachi to accept regasified gas from vessels operated by Excelerate Energy of the United States with onboard regasification capability (Platts, 2006b).

The proposed \$3.3 billion 1,270-kilometer (km) trans-Afghan gas pipeline with a transmission capacity of 30 billion cubic meters per year would be routed from Turkmenistan to Pakistan via Afghanistan and then on to India. However, Turkmenistan's commitment to meeting supply contracts remained a question. A plan for a 2,600-km gas pipeline that would transmit 55 billion cubic meters per year of gas from Iran to India through Pakistan was also under consideration. Gazprom of Russia was willing to provide financial and technical support to Iran to build the pipeline. Startup would be sometime after 2010 (Petroleum Economist, 2006c).

**Petroleum.**—The Government awarded three exploration licenses and petroleum concession agreements to local firm Mari Gas Co. Ltd. The licenses covered the Loralai, the Pishin, the Sibi, and the Ziarat blocks in the Province of Balochistan and the Hanna, the Harnai, and the Sujawal blocks in the Province of Sindh. The total area covered was 58,000 square kilometers (km<sup>2</sup>) (Petroleum Economist, 2006a).

The Government also awarded three joint exploration and production-sharing contracts to state-owned Government Holdings Private Ltd. and local firm Petroleum Exploration (Pvt) Ltd. The offshore blocks in the Arabian Sea covered an area of 4,170 km<sup>2</sup>. BP p.l.c. was awarded three offshore blocks that covered an area of 21,000 km<sup>2</sup> in Pakistan's Indus Delta and planned to explore for oil and gas with the right to operate any commercially viable discoveries. BP produced 22% of the country's oil and 6% of its gas. The company had discovered 61 oilfields and gasfields in the Badin and the Mehran concessions (BP News, 2006).

State-owned Oil and Gas Development Co. Ltd. discovered oil and gas reserves in the Kohat District of Northwest Frontier Province. The find was expected to produce 4,000 barrels per day (bbl/d) of oil and 340,000 cubic meters per day of gas (Petroleum Economist, 2006b).

Indus Refinery Ltd. (IRL) planned to bring onstream a 93,000-bbl/d refinery near Karachi by late 2008. IRL was a joint venture between Middle Eastern and local investors. The

entire project, including the dismantlement, shipment, and reconstruction of Petro-Canada's 90,000-bbl/d Oakville refinery, was expected to cost \$500 million. Secondary units, such as a catalytic cracker, desulfurizer, isomerizer, and polymerizer, would enable the plant to produce refined products. International trading company Vitol Group was to supply crude oil. IRL was targeting the domestic market and exports to Iran, Iraq, Oman, and the Far East markets (Platts, 2006a).

Pakistan Refinery Ltd. planned to invest \$182 million to upgrade its 50,000-bbl/d refinery at Korangi near Karachi. The revamp program entailed setting up additional units, including a 15,000-bbl/d diesel hydrotreater, a visbreaker, a vacuum distillation unit, a hydrogen generation plant, a de-asphalting unit, a sulfur recovery unit, and an amino treatment unit. The new units were expected to be completed in 3 years. The new units would produce fuels for the domestic market and for export. The refinery was shut down for a month in August for routine maintenance (Platts, 2006c).

## Outlook

Owing to lower levels of foreign investment and domestic political constraints, Pakistan's economic growth is expected to continue at a slower pace in the next 2 years. The country's oil refining industry is expected to increase output of its petroleum products in 2 to 3 years when one refinery is relocated and the other upgraded. Production from the Reko Diq copper-gold deposits, which are currently being developed, is expected to overtake the current copper production by Saindak Metals in 2010 and position the country as a significant producer of copper in the South Asia region. With the discovery of the Thar coal deposits and construction of three coal-fired powerplants in progress, Pakistan's power generation capacity is expected to increase in the future.

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TABLE 1  
PAKISTAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006 <sup>c</sup>
<b>METALS</b>					
Bauxite, gross weight	12,233	4,098	4,847	6,504	7,000
Chromium ore:					
Gross weight	24,185	30,657	29,230	46,359	48,000
Cr <sub>2</sub> O <sub>3</sub> content <sup>c</sup>	10,900	13,800	13,200	20,900	21,600
Copper, mine, Cu content	--	3,200	15,000	17,700	19,100
Iron and steel:					
Iron ore, gross weight <sup>e</sup> thousand metric tons	40 <sup>r</sup>	40 <sup>r</sup>	50 <sup>r</sup>	50 <sup>r</sup>	60
Pig iron do.	4,942	11,773	84,946	104,278	105,000
Steel, crude <sup>c</sup> do.	1,000 <sup>r</sup>	1,000 <sup>r</sup>	1,100 <sup>r</sup>	1,100 <sup>r</sup>	1,100
Lead, refined, secondary <sup>c</sup>	2,100	2,330	3,000 <sup>2</sup>	3,200	3,100
<b>INDUSTRIAL MINERALS</b>					
Abrasives, natural, emery <sup>c</sup>	150	150	150	150	150
Barite	21,451	40,745	44,207	42,087	43,000
Cement, hydraulic <sup>c</sup> thousand metric tons	10,300	10,300	10,400	10,600	11,000
Chalk	7,881	7,752	7,735	8,146	8,000
Clays:					
Bentonite	11,476	11,290	6,316	15,671	16,000
Fire clay	174,429	120,243	192,728	253,501	240,000
Fuller's earth	15,521	16,670	13,986	17,001	18,000
Kaolin, china clay	53,542	39,575	25,204	37,732	38,000
Other <sup>c</sup>	209,000	210,000	212,000	215,000	216,000
Feldspar	35,071	37,344	30,373	25,032	24,000
Fluorspar <sup>c</sup>	1,000	1,000	1,026 <sup>2</sup>	1,040	1,050
Gypsum, crude	401,748	424,107	467,065	552,496	590,000
Magnesite, crude	4,637	2,645	6,074	3,029	4,000
Nitrogen, N content of ammonia	2,213,900 <sup>r</sup>	2,356,500 <sup>r</sup>	2,114,000 <sup>r</sup>	2,114,000 <sup>r</sup>	2,200,000
Phosphate rock:					
Gross weight	1,362	2,562	4,614	2,687	2,800
P <sub>2</sub> O <sub>5</sub> content <sup>c</sup>	250	470	840	490	500
Pigments, mineral, natural, ochre <sup>c</sup>	5,000	5,000	5,000	5,500	5,500
Salt:					
Rock thousand metric tons	1,423	1,426	1,640	1,648	1,650
Marine do.	14	17	12	14	13
Total do.	1,437	1,443	1,652	1,662	1,663
Sand, glass	172,000	75,000	--	--	-- <sup>2</sup>
Sodium compounds, n.e.s. <sup>c</sup>					
Caustic soda	230,000	230,000	230,000	250,000	240,000
Soda ash, manufactured	240,000	240,000	240,000	260,000	250,000
Stone:					
Aragonite and marble	685,258	1,066,276	993,558	1,280,304	1,200,000
Dolomite	312,886	340,864	297,419	199,653	240,000
Limestone thousand metric tons	10,820	11,880	13,150	14,857	15,000
Other, as "ordinary stone" do.	1	2	4	6	5
Strontium minerals, celestite	382	402	570	1,855	1,900
Sulfur, native	22,580	19,402	23,873	24,158	23,000
Talc and related materials, soapstone	53,573	65,813	52,483	20,564	24,000

See footnotes at end of table.

TABLE 1--Continued  
 PAKISTAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006 <sup>c</sup>	
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
Coal, all grades	thousand metric tons	3,512	3,609	3,325	3,367	3,400
Coke <sup>c</sup>	do.	950	500	-- <sup>2</sup>	-- <sup>2</sup>	-- <sup>2</sup>
Gas, natural:						
Gross production	million cubic meters	26,161	28,111	34,063	38,089	40,000
Marketed production, sales <sup>c</sup>	do.	22,000	24,000	30,000	34,000	36,000
Natural gas liquids <sup>c</sup>	thousand 42-gallon barrels	650	650	650	700	700
Petroleum:						
Crude	do.	23,195	23,458	22,625	24,119	25,000
Refinery products:						
Gasoline	do.	9,809	8,013	9,616	9,959	10,000
Jet fuel	do.	5,747	6,388	7,432	8,833	9,000
Kerosene	do.	2,704	2,118	1,794	1,511	1,300
Distillate fuel oil	do.	20,610	21,893	24,315	26,857	28,000
Residual fuel oil	do.	23,495	22,832	22,794	23,346	23,000
Lubricants	do.	1,379	1,319	1,334	1,401	1,500
Other	do.	6,395	7,066	9,251	10,264	12,000
Total	do.	70,139	69,629	76,536	82,171	84,800

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>1</sup>Revised. -- Zero.

<sup>1</sup>Table includes data available through August 14, 2007.

<sup>2</sup>Reported figure.

TABLE 2  
PAKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity <sup>e</sup>
Barite		Bolan Mining Enterprises	Khuzdar, Balochistan	24
Do.		Razvi Mining (Private) Ltd.	Gandori, Kalan, and Retri	30
Cement		Askari Cement Co. Ltd.	Nizampur	1,200
Do.		Attock Cement Pakistan Ltd.	Hub Chowki	800
Do.		Cherat Cement Co. Ltd.	Nowshera	750
Do.		Dandot Cement Co. Ltd.	Dandot	500
Do.		Fauji Cement Co. Ltd.	Jhang Bahtar	1,170
Do.		Gharibwhal Cement Ltd.	Jhelom	540
Do.		Javedan Cement Ltd.	Karachi	600
Do.		D. G. Khan Cement Co. Ltd.	Chakwal and Dera Ghazi Khan	1,650
Do.		Kohat Cement Co. Ltd.	Kohat	700
Do.		Lucky Cement Ltd.	Pezu	1,660
Do.		Maple Leaf Cement Factory Ltd.	Daudkhel	1,500
Do.		Pakistan Cement Co.	Between Islamabad and Lahore, Punjab	2,200
Do.		Pioneer Cement Ltd.	Chenki	1,300
Do.		Thatta Cement Co. Ltd.	Thatta	300
Do.		Zeal Pak Cement Factory Ltd.	Hyderabad	1,080
Chromite		Pakistan Chrome Mines Ltd.	Gwal, Khanozai, Muslim Bagh, and Nisai	20
Coal		Sindh Coal Authority	Dadu, Sindh	4,000
Do.		do.	Thar, Sindh	NA
Copper, metal		Saindak Metals Ltd.	Chagai, Balochistan	22
Gas, natural	million cubic meters per day	Pakistan Petroleum Ltd.	Adhi, Punjab; Kandhkot and Mazarani, Sindh; and Sui, Balochistan	24
Do.	do.	Oil and Gas Development Co. Ltd.	37 oilfields and gasfields	31
Petroleum, crude	42-gallon barrels per day	Pakistan Petroleum Ltd.	Adhi, Punjab	1,600
Do.	do.	Oil and Gas Development Co. Ltd.	37 oilfields and gasfields	46,000
Petroleum, refined		Bosicor Pakistan Ltd.	Karachi	30,000
Do.	do.	Pak-Arab Refinery Co. Ltd.	Mahmood Kot, Punjab	100,000
Steel, crude		Pakistan Steel Mills Corp. Ltd.	Karachi	1,100

<sup>e</sup>Estimated. NA Not available.