



2005 Minerals Yearbook

SUDAN

THE MINERAL INDUSTRY OF SUDAN

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In Sudan, rising production of crude petroleum in recent years has substantially increased the mineral sector's influence on the national economy. Other mineral commodities produced included cement, chromite, gold, gypsum, marble, refined petroleum products, salt, semimanufactured steel, and silver. Sudan is also known to have deposits of barite, copper, iron ore, kyanite, lead, nickel, talc, tungsten, wollastonite, and zinc.

Sudan's real gross domestic product (GDP) increased by 8% in 2005 after rising by a revised 5.2% in 2004. The petroleum sector accounted for 15% of the GDP in 2005; manufacturing, 7%; building and construction, 4%; electricity and water, 1%; and mining and quarrying, less than 1%. In 2005, the nominal GDP amounted to nearly \$85 billion when adjusted for purchasing power parity. The per capita GDP based on purchasing power parity was about \$2,400 (Bank of Sudan, 2006b, p. 34; International Monetary Fund, 2006¹).

In 2005, the petroleum sector grew at a rate of 11.3%, and other extractive industries, by 2%. The petroleum sector accounted for 20% of the growth in Sudan's real GDP in 2005. The electricity and water sector grew by 8.5%; construction, 5%; and manufacturing, 2.8% (Bank of Sudan, 2006b, p. 34).

Civil war and social strife in Sudan limited, to a large extent, investment in the mineral sector and other sectors of the economy. Sanctions by the United Nations (1996) and the United States (1997) set legal barriers to investment in the country and were followed by the Sudan Peace Act that was ratified by the Congress of the United States in 2002. The purpose of the Sudan Peace Act was to block loans to Sudan from international financial institutions if the Government of Sudan were to reject peace negotiations with the Sudanese People's Liberation Army (SPLA). The alleged use of revenues from petroleum sales to finance operations in the Sudan conflicts constituted one of the reasons for promulgating the Act (U.S. Department of the Treasury, 2000; Africa Energy Intelligence, 2002).

On December 31, 2004, the Government signed a permanent cease-fire with the SPLA, and a comprehensive peace agreement was signed on January 9, 2005. The agreement included protocols for sharing legislative power and natural resources. The agreement did not address the separate conflict in Darfur (United Nations Integrated Regional Information Networks, 2005b).

Commodity Review

Metals

Gold.—The Ariab Mining Company Ltd. (AMC) operated the Hassai Mines, which was Sudan's only large-scale gold producer. The company held other gold concessions in Sudan. In 2005, AMC produced 4,728 kilograms (kg) of gold at Hassai.

¹References that include a section mark (§) are found in the Internet References Cited section.

Reserves at Hassai were estimated to be 4.1 million metric tons at a grade of 4.95 grams per metric ton gold. The life of the mine was expected to be 4 years; the reprocessing of tailings could extend the mine's life by 7 years (La Mancha Resources Inc., 2006).

In 2005, gold exports amounted to 8,517 kg at a value of \$63.6 million, or about 1% of total exports. In addition to the gold produced and exported by AMC and Sudanese artisanal miners, some of Ethiopia's artisanal gold output was reported to be smuggled through Sudan (Bank of Sudan, 2006a, p. 8).

Iron and Steel.—Sudan Master Technology operated a meltshop and rolling mill in Giad Industrial City. In 2004 (the latest year for which data were available), the production of rebar at Giad Industrial City decreased to 35,740 metric tons (t) from 63,936 t in 2003. In 2005, imports of iron and steel were \$717 million compared with \$342 million in 2004. Iron and steel accounted for nearly 11% of Sudan's total imports (Bank of Sudan, 2006a, p. 31-32; undated, p. 4.9).

Industrial Minerals

Cement.—In 2004 (the latest year for which data were available), national cement production rose to 307,100 t from 271,900 t in 2003. The Atbara and the Rabak cement plants had a combined capacity of 500,000 metric tons per year. In 2004, production at Atbara increased to 240,000 t from 199,900 t in 2003; production at Rabak decreased to 67,100 t from 72,000 t (Bank of Sudan, undated, p. 4.13).

Mineral Fuels

In 2005, Sudan's production of crude petroleum was about 120 million barrels (Mbbbl) compared with 118 Mbbbl in 2004 and 103.4 Mbbbl in 2003. Sudan accounted for nearly 4% of African crude petroleum production in 2004. Domestic petroleum reserves were not less than 2.7 billion barrels (Gbbbl).

The Greater Nile Petroleum Operating Company (GNPOC) [a joint venture of China National Petroleum Corp. (CNPC) (40%), Petronas Carigali Overseas Shd. Bhd. of Malaysia (30%), ONGC Videsh Ltd. of India (25%), and Sudan Petroleum Company Ltd. (Sudapet) (5%)] held Blocks 1, 2, and 4 in south central Sudan. GNPOC produced crude petroleum from the Bamboo, the Diffra, the el-Toor, the Grand Heglig, the Khairat Northeast, the Tooma South, and the Unity oilfields. In 2004, GNPOC produced 314,800 barrels per day (bbl/d) from Blocks 1, 2, and 4 compared with 283,400 bbl/d in 2003. Reserves in Blocks 1, 2, and 4 were estimated to be more than 1 Gbbbl in 2004 (Niell, 2004; Africa Energy Intelligence, 2005a).

CNPC held Block 6, which was located to the northwest of Muglad. Reserves in Block 6 were reported to be 700 Mbbbl. In 2005, CNPC produced at the Fula Field in Block 6 at a rate of about 10,000 bbl/d. Production was expected to rise to 99,000 bbl/d in 2006 and 2007 and eventually to 170,000 bbl/d

(Nield, 2004; Peng, 2006; United Nations Joint Logistics Center, 2006, p. 31).

Blocks 3 and 7 in eastern Sudan were held by the Petrodar Consortium [CNPC (41%), Petronas (40%), Sudapet (8%), Gulf Petroleum Company of Qatar (6%), and the Al-Thani Group of Sudan (5%)]. The Adar-Yale field near Malakal produced small amounts of crude petroleum that were refined at El Obeid. Blocks 3 and 7 had reserves of 775 Mbbl. CNPC, which was the operating company, planned to start production in Blocks 3 and 7 in 2006 at an initial rate of 75,000 bbl/d. The company planned to increase output to 150,000 bbl/d by the end of 2006; production could rise eventually to between 300,000 bbl/d and 350,000 bbl/d (Nield, 2004; Sudan Tribune, 2006§).

Blocks 5A and 5B were located in the Muglad Basin. Block 5A was held by White Nile Petroleum Operating Company [Petronas (68.9%), ONGC Videsh (24.1%), and Sudapet (7%)]; reserves at the Thar Jath field in Block 5A were reported to be 250 Mbbl. Block 5B was held by Petronas (39%), Lundin Petroleum AB of Sweden (24.5%), ONGC Videsh (23.5%), and Sudapet (13%). In March 2005, White Nile signed an agreement with the Government to develop the Thar Jath field. Production at Thar Jath was expected to reach its initial capacity of 80,000 bbl/d by the end of March 2006. In December, Petronas announced plans to start exploration in Block 5B in early 2006; the drilling of up to three exploration wells would commence by the end of 2006 (Lundin Petroleum AB, 2005; Reuters, 2005).

Sudapak Operating Company [Zaver Petroleum Corp. Ltd. of Pakistan (85%), and Sudapet (15%)] held Block 9 in the vicinity of Khartoum; Block 11 in Gezira, North Kordofan, Northern, and White Nile States to the west of Block 9; and Block A in southern Sudan near Blocks 1, 2, 5A, 5B, 7, and B. In 2005, the first well drilled in Blocks 9 and 11 was dry. Sudapak also explored for petroleum in Block A, which was bordered to the southwest by Blocks 5A and 5B and to the northwest by Block 7 (United Nations Joint Logistics Center, 2006, p. 32).

Block 14 in northwestern Sudan was held by the state-owned company PetroSA (Pty) Ltd. of South Africa and Sudapet. In 2005, the companies started a preexploration study in Block 14; an exploration and production-sharing agreement could be signed if the study yields favorable results (United Nations Joint Logistics Center, 2006, p. 32).

In December 2004, Kuwait Petroleum Corp., Marathon Oil Corp., and Total S.A., renegotiated their production-sharing agreement with the Government for Block B in southern Sudan. The original agreement was signed in 1983; the companies had suspended their involvement in the development of the block because of civil unrest. In February 2005, the government of South Sudan awarded a 60% interest in Block Ba, which was part of Block B, to White Nile of the United Kingdom; the remaining 40% was awarded to Nile Petroleum Corp., which was owned by the government of South Sudan. Total disputed White Nile's control of Block Ba; the national Government confirmed the ownership of Block Ba by Total and its joint-venture partners in September 2005 (Africa Energy Intelligence, 2005d).

Block C, which is located to the southwest of Block 6 in western Sudan, was held by the Advanced Petroleum Company [Cliveden Petroleum Company of Switzerland (37%), Hi-Tech

Petroleum of Sudan (28%), Sudapet (17%), the government of Khartoum State (10%), and Heglieg Petroleum (8%)]. In late 2005, Cliveden agreed to sell its interest in Block C to High Tech Group (Africa Energy Intelligence, 2005b).

In March 2005, the government of Khartoum State signed a memorandum of understanding with Videocon of India to explore for petroleum in Block 13, which is located north of Port Sudan on the Red Sea. In September, the government awarded the exploration rights to Block 15 to the Red Sea Petroleum Operating Company [CNPC (35%), Petronas (35%), Sudapet (15%), Express Petroleum and Gas Company of Nigeria (10%), High Tech Group (5%)]. Block 15 was an onshore and offshore block located in the Red Sea between Port Sudan and the border with Eritrea. At the end of 2005, Block 10 in Gedaraf State and Blocks 12A and 12B in Darfur State remained unawarded. The civil war in Darfur inhibited the development of Block 12 (Africa Energy Intelligence, 2005c; United Nations Joint Logistics Center, 2006, p. 32).

In 2004 (the latest year for which data were available), Sudan's output of petroleum products increased to 25.6 Mbbl from about 22.5 Mbbl in 2003 (table 1). The Khartoum Oil Refinery, which was operated by CNPC, accounted for a majority of the country's refining capacity. The refinery had a capacity of 50,000 bbl/d in 2003; CNPC increased capacity to 60,000 bbl/d in 2004 and 90,000 bbl/d in 2005. The company planned a further expansion to 120,000 bbl/d in November 2005 but was forced to delay this project until June 2006. In November 2003, the Government awarded a contract to ONGC Videsh to increase the capacity of the Port Sudan Refinery to 150,000 bbl/d from about 25,000 bbl/d. The upgrade was expected to be completed in 2009 (Clark, 2004; United Nations Joint Logistics Center, 2006, p. 10-11). Sudan also had topping plants at Abu Jabra, El Obeid, and Shajirah that produced mainly heavy fuel oil.

In 2005, exports of crude petroleum were \$3.95 billion compared with \$2.96 billion in 2004. Crude petroleum accounted for 82% of the value of Sudan's total exports in 2005. China accounted for 81% of Sudan's crude petroleum and petroleum product exports, and Japan, 14% (Bank of Sudan, 2006a, p. 14, 18, 20).

In 2005, exports of petroleum products were \$239 million compared with \$142 million in 2004. Petroleum products accounted for 5% of the value of Sudan's total exports in 2005. Imports of petroleum products were \$322 million in 2005 compared with \$101 million in 2004. Petroleum products accounted for nearly 5% of the value of Sudan's imports in 2005 (Bank of Sudan, 2006a, p. 14, 31-32).

Infrastructure

In 2004 (the latest year for which data were available), domestic production of electricity increased to 3,749 gigawatthours (GWh) from 3,354 GWh in 2003. Thermal power stations generated 2,608 GWh in 2004 compared with 2,191 GWh in 2003; production from hydroelectric power stations fell to 1,140 GWh from 1,163 GWh. Domestic consumption of electricity increased to 2,495 GWh in 2004 from 2,320 GWh in 2003; industrial consumption fell to 419 GWh from 514 GWh.

A new hydroelectric plant with a capacity of 1,250 megawatts was expected to be completed in mid- to late 2007 (United Nations Joint Logistics Center, 2006, p. 4; Bank of Sudan, undated, p. 4.15-4.16).

The 1,610-km crude petroleum pipeline that ran from Blocks 1, 2, and 4 to the El Obieid and the Khartoum refineries and Sudan's Red Sea coast was commissioned in mid-1999. In late 2004, CNPC completed a 730-km crude petroleum pipeline from the Fula Field in the Block 6 oilfields to the Khartoum Oil Refinery. In 2005, the 1,400-km Petrodar crude petroleum pipeline that runs from Blocks 3 and 7 to the coast was completed. Also in 2005, a consortium of Indian companies led by ONGC Videsh completed a new 741-km petroleum products pipeline that runs from the Khartoum Oil Refinery to Port Sudan in 2005 (Clark, 2004; Nield, 2004; United Nations Joint Logistics Center, 2006, p. 32).

Outlook

The International Monetary Fund (2006§) predicted that Sudan's GDP would rise by 13% in 2006 and 10.3% in 2007. High rates of GDP growth may lead to increased demand for such local construction materials as cement, gravel, limestone, marble, and sand. With the start of production in Blocks 3, 5A, and 7, and higher production from Block 6, Sudan's crude petroleum output could rise to as much as 620,000 bbl/d by the end of 2006. Plans to increase petroleum production depend upon political stability; the success of the peace agreement between the Government and the SPLA is a key factor. The separate conflict in Darfur, which contained parts of Blocks C and 12, remained unresolved at the end of 2005 (United Nations Integrated Regional Information Networks, 2005a).

References Cited

- Africa Energy Intelligence, 2002, Sudan—U.S. turns the screws: Africa Energy Intelligence, no. 332, October 23-November 6, p. 2.
Africa Energy Intelligence, 2005a, Sudan—Bumper year for CNPC: Africa Energy Intelligence, no. 385, January 19-February 1, p. 5.

- Africa Energy Intelligence, 2005b, Sudan—Cliveden to bow out: Africa Energy Intelligence, no. 404, November 9.
Africa Energy Intelligence, 2005c, Sudan—Indian firm in Red Sea push: Africa Energy Intelligence, no. 384, January 5-18, p. 1.
Africa Energy Intelligence, 2005d, Sudan to draw the crowd in 2005: Africa Energy Intelligence, no. 392, April 27-May 17, p. 4-5.
Bank of Sudan, 2006a, Foreign trade statistical digest: Khartoum, Sudan, Bank of Sudan, Fourth quarter, 43 p.
Bank of Sudan, 2006b, The 45th annual report 2005: Khartoum, Sudan, Bank of Sudan, 208 p.
Bank of Sudan, [undated], The 44th annual report 2004: Khartoum, Sudan, Bank of Sudan, 131 p.
Clark, Martin, 2004, Pipelines and peace talks: *Petroleum Economist*, v. 71, no. 2, February, p. 20.
La Mancha Resources Inc., 2006, La Mancha and Areva NC announce gold mining transaction: Vancouver, British Columbia, Canada, La Mancha Resources Inc. press release, June 5, 8 p.
Lundin Petroleum AB, 2005, Lundin Petroleum—Field operations to resume in Block 5B, onshore Sudan: Stockholm, Sweden, Lundin Petroleum AB press release, December 7, 2 p.
Nield, Richard, 2004, Sudan—Politics and untapped potential: *Middle East Economic Digest*, v. 48, no. 28, July 9-15, p. 29-31.
Peng, Renya, 2006, CNPC JV Sudan refinery expansion done, to export gasoline: *Dow Jones Energy Service*, July 10, 2 p.
Reuters, 2005, Sudan inks oil field deal with ONGC consortium: Reuters press release, March 28, 1 p.
United Nations Integrated Regional Information Networks, 2005a, Sudan—Darfur situation becoming increasingly hostile—Aid workers: New York, New York, United Nations Integrated Regional Information Networks press release, December 8, 3 p.
United Nations Integrated Regional Information Networks, 2005b, Sudan—Hopes for lasting peace in the south: New York, New York, United Nations Integrated Regional Information Networks press release, January 11, 6 p.
United Nations Joint Logistics Center, 2006, Sudan fuels 2006: Rome, Italy, United Nations Joint Logistics Center, 33 p.
U.S. Department of the Treasury, 2000, Treasury applies Sudan sanctions to joint oil venture: Washington, DC, U.S. Department of the Treasury press release, February 6, 1 p.

Internet References Cited

- International Monetary Fund, 2006 (April), Sudan, World Economic Outlook Database, accessed June 27, 2006, via URL <http://www.imf.org/external/pubs/ft/weo/2006/01/data/index.htm>.
Sudan Tribune, 2006 (February 14), Sudan oil output to double by year's end, accessed June 26, 2006, at URL http://www.sudantribune.com/article.php?id_article=14079.

TABLE 1
SUDAN: PRODUCTION OF MINERAL COMMODITIES¹

Commodity ²		2001	2002	2003	2004	2005 ^e
Cement, hydraulic	metric tons	189,500	204,800	271,900	307,100	280,000
Chromite, mine output, gross weight ³	do.	20,500	14,000	37,000	26,000	26,000
Gold, mine output, Au content ⁵	kilograms	5,417	5,239	5,106	5,000 ^e	4,728 ⁴
Gypsum	metric tons	2,422	4,540	13,304	14,000 ^e	14,000
Marble	cubic meters	15,500	22,000	22,000	22,000 ^e	22,000
Petroleum:						
Crude, including lease condensate	thousand 42-gallon barrels	77,755	87,759	103,400	118,000	120,000
Refinery products:						
Liquefied petroleum gas	do.	2,493	2,792	2,658	3,235 ^r	3,300
Gasoline	do.	7,183 ^r	7,546 ^r	7,318 ^r	8,109 ^r	8,200
Naphtha	do.	198	303	260	248 ^r	250
Jet fuel	do.	910	1,339	1,236	1,562 ^r	1,600
Kerosene	do.	230	259	282	294 ^r	300
Distillate fuel oil	do.	7,198 ^r	7,631 ^r	8,241 ^r	9,708 ^r	9,800
Residual fuel oil	do.	1,656	1,991	2,503	2,444 ^r	2,500
Total	do.	19,868 ^r	21,861 ^r	22,498 ^r	25,600 ^r	26,000
Salt	metric tons	77,783	83,340	61,096	62,000 ^e	62,000
Silver	kilograms	1,598	3,256	2,844	2,900 ^e	2,900
Steel, semimanufactured	metric tons	42,785	53,035	63,936	35,740 ^r	36,000

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^rRevised.

¹Table includes data available through November 30, 2006.

²In addition to the commodities listed, the following are presumably produced although available information is inadequate to estimate output: clay and/or shale for cement manufacture (normally about 0.4 metric ton of clay and/or shale per metric ton of finished cement); limestone for cement manufacture (normally at least 1.25 metric tons per metric ton of finished cement), agriculture, lime manufacture, and construction aggregate and fill; other construction materials (clays, sand and gravel, stone, and others for local use); and mica.

³Presumed to be ores and concentrates with an estimated average grade of about 54% chromic oxide.

⁴Reported figure.

⁵Does not include artisanal output.

TABLE 2
SUDAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2005

(Metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Cement		Atbara Cement Company Ltd. (LaFarge Group of France and Dal Group of Sudan)	Plant at Atbara	400,000.
Do.		Nile Cement Company (Government, 100%)	Plant at Rabak	100,000.
Chromite		Ingessana Hills Mines Corp.	Mine at Ingessana Hills	48,000.
		Elneelain Works Co.	NA	NA.
Gold	kilograms	Compagnie Miniere Or [Government of Sudan, 60%, and Ariab Mining Company Ltd. (AMC), 40%]	Mines at Hassai	5,000.
Gypsum		Sudanese Mining Corp. (Government, 100%)	Bir Eit Mine	15,000.
Limestone		Atbara Cement Company Ltd.	Mine at Atbara	500,000.
Do.		Nile Cement Company	Mine at Rabak	200,000.
Mica		Sudanese Mining Corp. (Government, 100%)	Sheriek Mines	1,800.
Petroleum:				
Crude	thousand barrels	Greater Nile Petroleum Operating Co. (GNPOC) [China National Petroleum Corp. (CNPC), 40%; Petronas Carigali Overseas Shd. Bhd., 30%; ONGC Videsh Ltd., 25%; Sudan Petroleum Company Ltd. (Sudapet), 5%]	Block 1, El Toor, Tooma South, and Unity Fields; Block 1A, Khairat and Munga Fields; Block 2, Grand Heglig Field (Barki, Hamra, Heglig, Kanga Laloba, Rihan, and Toma Fields); Block 2A, Bamboo and Garaad Fields; Block 4, Diffra Field	120,000.
Do.	do.	Petrodar Consortium [China National Petroleum Corp., (CNPC) 41%; Petronas Carigali Overseas Shd. Bhd., 40%; Sudan Petroleum Company Ltd. (Sudapet), 8%; Gulf Petroleum Company of Qatar, 6%; Al-Thani Group, 5%]	Blocks 3 and 7	3,800.
Do.	do.	China National Petroleum Corp.	Block 6 (Fula Field)	3,650.
Refined	do.	Khartoum Oil Refinery [China National Petroleum Corp. (CNPC), 50%, and Sudan Petroleum Corp., 50%]	Refinery at Jali	33,000.
Do.	do.	Port Sudan Refining Ltd. (Government, 100%)	Refinery at Port Sudan	93 liquefied petroleum gas; gas; 1,014 gasoline; 898 kerosene; 2,499 diesel fuel; 4,154 residual fuel oil; 458 naphtha.
Do.	do.	Government	Refinery at El Obeid	3,700.
Do.	do.	Concorp Ltd.	Refinery at Shajirah	3,700.
Do.	do.	Government	Refinery at Abu Jabra	730.
Steel:				
Crude		Sudan Master Technology	Plant at Giad Industrial City	60,000.
Rebar		do.	do.	150,000.
Galvanized		Sudanese Malaysian Co.	NA	8,000.
Do.		Hafez el Barbary	NA	7,000.

NA Not available.