



# 2007 Minerals Yearbook

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## SUDAN

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# THE MINERAL INDUSTRY OF SUDAN

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In Sudan, increased production of crude petroleum in recent years has substantially strengthened the mineral sector's influence on the national economy. Sudan was not a globally significant producer or consumer of mineral commodities in 2007. Investment in Sudan's petroleum and petrochemical industries by U.S. individuals and organizations was banned by Executive Order 13412, which was issued by the President of the United States in October 2006. The alleged use of revenues from petroleum sales to finance operations in the Darfur conflict constituted one of the reasons for the Executive Order (Reuters Ltd., 2006).

## Minerals in the National Economy

In 2006 (the latest year for which data were available), the petroleum sector accounted for 15.2% of the gross domestic product; manufacturing, 6.9%; and mining and quarrying, 0.6%. The value of output in the petroleum sector grew by 10%, and mining and quarrying, by 5%. In 2007, crude petroleum exports amounted to \$8.05 billion, or 91% of total exports; petroleum products, 4%; and gold, 1% (Bank of Sudan, 2007, p. 33; 2008, p. 14).

## Production

In 2007, the production of crude petroleum increased by an estimated 12%. Chromite output declined by 46%, and gold, by 12%. From 2003 to 2007, crude petroleum production increased by 79%, and chromite and gold production declined by 58% and 45%, respectively.

## Structure of the Mineral Industry

Sudan's crude petroleum was produced by joint ventures of state-owned companies from China, India, Malaysia, and Sudan. The petroleum refineries were also state-owned; the Khartoum Oil Refinery was a joint venture between state-owned companies from China and Sudan. China National Petroleum Corp. (CNPC) operated the Khartoum Oil Refinery, which accounted for most of the country's refining capacity. The Government held a 56% share in the Hassai gold mine. The cement plants were privately owned.

## Commodity Review

### Metals

**Gold.**—La Mancha Resources Inc. of Canada produced 2,787 kilograms (kg) of gold at the Hassai Mine compared with 3,158 kg in 2006. Production declined in 2007 because of delays in commissioning the quartz ore milling circuit, which reduced the volume of ore processed. In 2008, the company expected to produce about 3,100 kg of gold. Reserves at Hassai were

estimated to be 1.2 million metric tons at a grade of 4.89 grams per metric ton gold (La Mancha Resources Inc., 2008, p. 7, 11, 49).

### Industrial Minerals

**Cement.**—Sudan had two cement plants with a total production capacity of 550,000 metric tons per year (t/yr). Al-Rajhi Group of Saudi Arabia was conducting a feasibility study on increasing the capacity of the Atbara plant by 1.8 million metric tons per year (Mt/yr). Nile Cement Company Ltd. planned to increase the capacity of the Rabak plant to 500,000 t/yr from 150,000 t/yr and to build a new plant with a capacity of 1.1 Mt/yr. Star Cement of the United Arab Emirates was conducting a feasibility study on a new plant near Khartoum with a capacity of 660,000 t/yr (Middle East Economic Digest, 2006a-c).

### Mineral Fuels

**Petroleum.**—In 2007, crude petroleum production increased to nearly 177 million barrels (Mbbl) from an estimated 158 Mbbl in 2006 and 126 Mbbl in 2005. Higher production from Blocks 3, 6, and 7 more than offset lower production from Blocks 1, 2, and 4.

The Greater Nile Petroleum Operating Co. [CNPC (40%), Petronas Carigali Overseas Shd. Bhd. of Malaysia, (30%), ONGC Videsh Ltd. of India (25%), and Sudan Petroleum Company Ltd. (Sudapet) (5%)] produced crude petroleum in Blocks 1, 2, and 4 in south central Sudan. In 2007, production in Blocks 1, 2, and 4 declined to 246,000 barrels per day (bbl/d) from an estimated 316,000 bbl/d in 2006. The decline in output may be attributable to overproduction in previous years. Reserves in Blocks 1, 2, and 4 were estimated to be 983 Mbbl (European Coalition on Oil in Sudan, 2008, p. 22, 24; Sudan Ministry of Finance, 2008).

CNPC held Block 6, which was located to the northwest of Muglad. In 2007, production in Block 6 increased to 39,000 bbl/d from an estimated 33,000 bbl/d in 2006. Reserves in Block 6 were estimated to be 299 Mbbl (European Coalition on Oil in Sudan, 2008, p. 22, 24; Sudan Ministry of Finance, 2008).

Blocks 3 and 7 in eastern Sudan were held by the Petrodar Consortium [CNPC (41%), Petronas (40%), Sudapet (8%), China Petroleum and Chemical Corp. (6%), and the Al-Thani Group of Sudan (5%)]. In 2007, production in Blocks 3 and 7 increased to 175,000 bbl/d from an estimated 66,000 bbl/d in 2006. Output in Blocks 3 and 7 was expected to increase to 300,000 bbl/d by 2010. Reserves in Blocks 3 and 7 were estimated to be 779 Mbbl (European Coalition on Oil in Sudan, 2008, p. 20, 22, 24; Sudan Ministry of Finance, 2008).

The growth of Sudan's oil revenues was inhibited by problems with the Dar Blend of crude petroleum produced in Blocks 3

and 7. The Dar Blend is highly acidic, which forces refineries to upgrade their equipment to avoid damage. The high paraffin content increases transportation costs because the crude must be kept at higher temperatures to avoid congealing. High arsenic levels contaminate refinery catalysts (European Coalition on Oil in Sudan, 2008, p. 30).

Petronas was engaged in a joint venture with the Government of Sudan to build a new refinery at Port Sudan to process the Dar Blend of crude petroleum. The refinery was expected to have a capacity of 174,000 bbl/d and to be completed by the end of 2010. Costs were estimated to be \$2.5 billion (Middle East Economic Digest, 2007a).

Blocks 5A and 5B were located in the Muglad Basin. Block 5A was held by White Nile Petroleum Operating Co. [Petronas (68.9%), ONGC Videsh (24.1%), and Sudapet (7%)]; the company started production in June 2006. Output was nearly 24,000 bbl/d in 2007. Reserves at the Thar Jath field in Block 5A were reported to be 168 Mbbbl. Block 5B was held by Petronas (39%), Lundin Petroleum AB of Sweden (24.5%), ONGC Videsh (23.5%), and Sudapet (13%). In 2007, exploratory drilling commenced in Block 5B (European Coalition on Oil in Sudan, 2008, p. 22, 24; Lundin Petroleum AB, 2008, p. 17; Sudan Ministry of Finance, 2008).

Kuwait Petroleum Corp., Marathon Oil Corp. of the United States, Nile Petroleum Corp. (which was owned by the governing authorities of South Sudan), and Total S.A. of France held Block B in southern Sudan. In June 2007, the National Petroleum Commission upheld Total's exploration rights in Block B, which were disputed by White Nile Ltd. of the United Kingdom. White Nile had been granted the right to explore part of Block B by the governing authorities of South Sudan in 2005. Marathon announced its withdrawal from Block B because of U.S. sanctions (Middle East Economic Digest, 2007b).

Block 13 on the Red Sea was awarded to a consortium led by CNPC in July 2007. CNPC and its joint-venture partners agreed to spend \$25 million on exploration at Block 13 during the next 3 years. At the end of 2007, Block 10 in Gedaraf State, Block 12B in Darfur State, and Block E in South Sudan were unassigned (Reuters Ltd., 2007).

## Outlook

Crude petroleum production could increase to more than 600,000 bbl/d by 2010 if the planned increases in output from Blocks 3 and 7 proceed. Further increases in production could come from Blocks 5A and 6. These increases are likely to more than offset lower output from Blocks 1, 2, and 4. The development of Block 12A depends on resolution of the conflict in Darfur. Cement production capacity could increase by as much as 3.9 Mt/yr; the production of other construction materials also could increase substantially. Little change is expected for chromite, gold, and silver production.

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

Commodity <sup>2</sup>		2003	2004	2005	2006	2007 <sup>c</sup>
Cement, hydraulic	metric tons	271,900	307,100	331,200	202,200	200,000
Chromite, mine output, gross weight <sup>3</sup>	do.	37,000	26,000	21,654	28,772 <sup>r</sup>	15,476 <sup>4</sup>
Gold, mine output, Au content <sup>5</sup>	kilograms	5,106	5,000	3,625	3,158	2,787 <sup>4</sup>
Gypsum <sup>c</sup>	metric tons	13,304 <sup>4</sup>	14,000	14,000	15,000	15,000
Marble	cubic meters	23,000	24,000	24,000	26,000	26,000
<b>Petroleum:</b>						
Crude, including lease condensate	thousand 42-gallon barrels	98,500	111,000	126,000	158,000 <sup>c</sup>	176,574 <sup>4</sup>
Refinery products:						
Liquefied petroleum gas	do.	2,658	3,235	3,010	3,742	3,700
Gasoline	do.	7,318	8,109	7,827	9,717	9,700
Naphtha	do.	260	248	248	216	220
Jet fuel	do.	1,236	1,562	1,596	1,445	1,400
Kerosene	do.	282	294	340	320	320
Distillate fuel oil	do.	8,241	9,708	9,965	13,554	14,000
Residual fuel oil	do.	2,503	2,444	2,589	2,566	2,600
Total	do.	22,498	25,600	25,575	31,560	31,900
Salt <sup>c</sup>	metric tons	61,096 <sup>4</sup>	63,000	65,000	68,000	68,000
Silver <sup>c</sup>	kilograms	2,844 <sup>4</sup>	2,800	2,000	1,800	1,700
Steel, semimanufactured	metric tons	63,936	35,740	67,015	67,000 <sup>c</sup>	67,000

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

<sup>1</sup>Table includes data available through October 20, 2008.

<sup>2</sup>In 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.

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

<sup>4</sup>Reported figure.

<sup>5</sup>Does not include artisanal output.

TABLE 2  
SUDAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Cement		Al-Rajhi Group	Plant at Atbara	400,000
Do.		Nile Cement Company Ltd.	Plant at Rabak	150,000
Chromite		Ingessana Hills Mines Corp.	Mine at Ingessana Hills	48,000
Gold	kilograms	Compagnie Minière Or S.A. (Government of Sudan, 56%, and La Mancha Resources Inc., 40%)	Mine at Hassai	5,000
Gypsum		Sudanese Mining Corp. (Government, 100%)	Bir Eit Mine in Red Sea State	15,000
Limestone		Atbara Cement Company Ltd.	Mine at Atbara	500,000
Do.		Nile Cement Company Ltd.	Mine at Rabak	200,000
Mica		Sudanese Mining Corp. (Government, 100%)	Mines at Sheriek	1,800
<b>Petroleum:</b>				
Crude	thousand 42-gallon barrels	Greater Nile Petroleum Operating Co. [China National Petroleum Corp. (CNPC), 40%; Petronas Carigali Overseas Shd. Bhd., 30%; ONGC Videsh Ltd., 25%; Sudan Petroleum Company Ltd. (Sudapet), 5%]	Blocks 1, 2, and 4 in Unity State	120,000
Do.	do.	Petrodar Consortium [China National Petroleum Corp. (CNPC), 41%; Petronas Carigali Overseas Shd. Bhd., 40%; Sudan Petroleum Company Ltd., 8%; China Petroleum and Chemical Corp., 6%; Al-Thani Group, 5%]	Blocks 3 and 7 in Upper Nile State	73,300
Do.	do.	China National Petroleum Corp. (CNPC)	Block 6 near Muglad	14,600
Do.	do.	White Nile Petroleum Operating Co. [Petronas Carigali Overseas Shd. Bhd., 68.9%; ONGC Videsh Ltd., 24.1%; Sudan Petroleum Company Ltd. (Sudapet), 7%]	Block 5A in Unity State	14,600
Refined	do.	Khartoum Oil Refinery [China National Petroleum Corp. (CNPC), 50%, and Sudan Petroleum Corp., 50%]	Refinery at Jali	36,500
Do.	do.	Port Sudan Refining Ltd. (Government, 100%)	Refinery at Port Sudan	7,900
<b>Steel:</b>				
Crude		Sudan Master Technology	Plant at Giad Industrial City	60,000
Rebar		do.	do.	150,000
Do.		Sudanese Steel Products Ltd. (subsidiary of Hafez Elsayad Barbary Ltd.)	Plant at Khartoum	150,000
Galvanized		do.	do.	20,000
Do., do. Ditto.				