

ANGOLA

By George J. Coakley

The Republic of Angola had a population of more than 13 million in a 1,246,700-square-kilometer (km²) area. The area includes Cabinda, which is a coastal strip 100 kilometers (km) wide and 150 km long that is located between the Republic of the Congo [Congo (Brazzaville)] and the Democratic Republic of the Congo [Congo (Kinshasa)]. The mineral economy of Angola was dominated by petroleum; diamond was another important source of revenue. Petroleum accounted for 45% of the gross domestic product (GDP) and more than 90% of exports. For 2002, per capita GDP, which is based on purchasing power parity, was estimated to be \$1,600. During 2002, the economy had a GDP real growth rate of 9.0%. Increased oil production was expected to lead to a 6% real GDP growth for 2003. The excessively high inflation rate was reduced to 106% in 2002 from 325% in 2001 (U.S. Central Intelligence Agency, 2003§¹).

According to the International Monetary Fund (2003§), the country had a favorable merchandise trade balance of payments in 2002 of \$4.65 billion based on export values of \$8.36 billion, of which crude oil exports accounted for \$7.56 billion; diamond, \$638 million at an average value of \$127 per carat; refined petroleum products, \$95 million; and liquefied natural gas, \$20 million. Merchandise imports were valued at \$3.71 billion. The major export trading partners, in terms of value of trade, were the United States (42%), the European Union (29%), and China (19%). The major import trading partners were the United States (42%), the European Union (38%), and South Africa (12%).

Events in early 2002 suggested a major turning point in the economic and political future of Angola. In January 2002, the leader of the National Union of the Total Independence of Angola (UNITA) rebel movement was killed, and in April 2002, a cease-fire agreement was signed between the Government and UNITA; this apparently brought an end to the nation's long civil war. During the 27-year conflict, about 1 million people were killed; tens of thousands were maimed, chiefly from land mines; more than 4 million people were displaced; and the country was left in massive debt. The country spent approximately one-third of its annual GDP to service its foreign debt, which was estimated in 2000 to be around \$11 billion and was one of the highest in Africa (African Forum & Network on Debt & Development, undated§).

Commodity Review

Industrial Minerals

Diamond.—Despite the ongoing civil war and United Nations sanctions against illegally mined diamond, officially reported

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

diamond production in 2002 decreased by 3% to 5.02 million carats of diamond. Sociedade Miniera de Catoca Ltda. (SMC) remained the largest producer with an output of approximately 2.8 million carats from its Catoca kimberlite pipe, which is located 35 km south of Saurimo. SMC was a joint venture of Empresa Diamantes de Angola (Endiama) (32.8%), Russia's Almaz Rossii-Sakha Joint Stock Company (ALROSA) (32.8%), Brazil's Odebrecht Mining Services Inc. (18.4%), and Israel's Lev Leviev (16%). SMC planned to invest more than \$50 million between 2002 and 2005 to increase production capacity to 7 million metric tons per year (Mt/yr) of ore that would yield 4,826,000 carats per year, which would increase revenues by \$300 million to \$350 million per year. ALROSA also was constructing a new hydropower plant on the Chikapa river near the mine (Pravda, 2002§; Sociedade Miniera de Catoca Ltda., 2002a§). Estimates of reserves in the Catoca kimberlite were reported to be 271 million metric tons of ore that contained 189.3 million carats of diamond (Sociedade Miniera de Catoca Ltda., 2002a§, b§).

The exploration rights of De Beers Angola Prospecting Ltd. (a wholly owned subsidiary of De Beers Consolidated Mines Ltd.) were suspended in May 2001. Previously, De Beers had discovered 17 new kimberlites in its concession areas in Lunda Norte and Lunda Sul. In November 2002, negotiations between De Beers and the Angolan Ministry of Mines and Geology were reopened on terms applicable to the mining and marketing of diamond from mines discovered as a result of De Beers prospecting and on the repayment of a \$50 million loan from De Beers to Endiama (Crankshaw, 2003).

In September 2002, the TransHex Group Ltd. of South Africa acquired a 30% interest in two alluvial diamond concessions at Fucuama and Luarica with a total diamond resource estimated to be 1.7 million carats. The two mines were expected to yield 400,000 carats per year. The Luarica diamond mine was scheduled to open in April 2003, and Fucuama was expected to start up by late 2003. Partners included Endiama (40%) and the local companies Micol and Som Veterang (12.5%) each. The Luarica Mine was expected to yield 800,000 carats of diamond valued at an estimated \$170 million in its first 5 years of operation (African Mining, 2003§; Trans Hex Group Ltd., 2003§).

DiamondWorks Ltd. of Canada held a majority interest in the Luo and Yetwene alluvial diamond projects, which have been placed on a care-and-maintenance basis since November 1999. DiamondWorks also held mining rights to five kimberlite pipes, which included the large Camatchia and Camagico Pipes. DiamondWorks underwent a financial and management restructuring in 2001 and was renegotiating with the Angolan Government to enforce existing rights, to establish new rights, and to receive compensation for historical investment during

2002. Meanwhile, the company was focusing its mining efforts on a diamond project in Sierra Leone.

During 2002, the operating agreement for the management of Sociedade Mineira do Camafuca, Ltda. was concluded. The agreement established a joint venture between Endiama, Welox Ltd., and SouthernEra Resources Ltd. of Canada, which will have free 18% carried interest. Plans were to finalize formation of the operating company and to begin development of its Camafuca kimberlite mine during 2003. SouthernEra had completed the Phase I feasibility study on the Camafuca-Camazamba kimberlite project in 2001 and estimated the total resources at Camafuca to a depth of 145 meters to be 210 million cubic meters at an average grade of 0.111 carat per cubic meter and to contain 23.24 million carats of diamond valued at \$109 per carat. An initial 5-year-long Phase I project would remove 6.13 million cubic meters of dredged material that could contain an average grade of 0.18 carat per cubic meter to yield 220,000 carats per year valued at \$117 per carat. Dredged material will be moved by a slurry pipeline to a land-based conventional dense-media separation plant. Estimated capital cost of the project was \$25 million, which will be contributed by Welox (SouthernEra Resources Ltd., 2002§, 2003§).

International Defense and Security Forces Resources NV (IDAS) of the Netherlands Antilles (a wholly owned subsidiary of American Mineral Fields, Inc. of Canada) held a 51% interest in the Cuango International area prospecting license and in the Luremo Mining license in the Cuango Valley. Partners included Endiama (38%) and a local company Twins (11%). Owing to the civil war, IDAS had only limited access to the concession since 2000. During 2002, a Heads of Agreement was ratified by the Angolan Council of Ministers, and IDAS was negotiating a comprehensive agreement to define the governance of the joint venture. When finalized, site evaluation work will begin again (American Mineral Fields, Inc., 2003§).

Following a 4-year forced closure, Petra Diamonds was scheduled to resume exploration work in 2003 on its Alto Cuilo project in Lunda Norte Province, where it discovered a kimberlite pipe in 1998. Petra was in partnership on the project with Endiama and a private Angolan company Moyoweno Ltda.

Sociedade de Desenvolvimento Mineiro de Angola, S.A.R.L., which was a joint venture of Ashton Mining Ltd. of Australia, Endiama, and Odebrecht Angola Ltd., held an 85,600-km² alluvial diamond concession in the Cuango River Valley, which is located near the town of Luzamba in northeastern Angola. The operations included the Tázua alluvial mine and a final recovery plant at Luzamba. No operational details for 2002 were available.

Other companies involved with diamond exploration and/or production included Associacao Chitotolo, which was owned by Sociedade Miniera de Lumanhe (50%), ITM Mining Ltd. (35%), and Endiama (15%); Botswana Diamondfields Inc. (a subsidiary of Crew Development of Canada); AmCan Minerals Ltd. of Canada; Randsburg International Gold Corp. of Canada; Trans Atlantic Enterprises Inc. of Canada; Majestic Resources of Australia; and a joint venture between SML (51%) and Sociedade Portuguesa de Empreendimentos (49%), which operated several alluvial projects that included the Calonda, Lucapa, and Mufuto projects in the Lunda Norte and Lunda Sud Provinces (Mbendi Information Services, 2002§).

Mineral Fuels

Petroleum and Natural Gas.—The oil industry was beginning to move into the production development phase following the highly successful offshore deepwater petroleum exploration programs of the past 6 years (1996–2002). The major consortiums that held oil-production-sharing agreements with the state-owned Sociedade Nacional de Combustiveis de Angola (Sonangol), which were led by BP p.l.c., ChevronTexaco Corp., ExxonMobil Angola Ltd., and TotalFinaElf, discovered six new oilfields during 2002, thus bringing the total new discoveries since 1996 to 41 (table 2). Although, historically, nearly two-thirds of oil production came from ChevronTexaco's block 0, new deepwater discoveries in blocks 14, 15, 17, 18, and 31 will significantly expand production. During 2001, ChevronTexaco's Kuito Field in block 14 and TotalFinaElf's large Girassol Field in block 17 came onstream to add about 285,000 barrels per day (bbl/d) of new production. During 2002, oil production increased by 22% to 903,000 bbl/d, with about 49% coming from Cabinda, 21% from block 17, and 15% from block 3.

ChevronTexaco announced plans to develop the Benguela/Belize oilfields at a production rate of 140,000 bbl/d and to invest \$2 billion in partnership with Sonangol to develop a 5-billion-cubic-meter-per-year gas-processing plant at Luanda. ExxonMobil was investing more than \$3 billion to develop the 80,000-bbl/d Xicomba oilfield in block 15 by 2003 and the Kizomba oilfields at a rate of 600,000 bbl/d by 2006. ExxonMobil also was seeking financing to develop a \$3.6 billion oil refinery at Lobito with a capacity to produce 200,000 bbl/d of refined oil by 2006. BP was planning to build a new floating production storage and offloading vessel to develop the Cobalto and Plutonio oilfields at a rate of 80,000 bbl/d by 2005. This successful exploration would increase national reserves to an estimated 12 billion barrels of oil and 270 billion cubic meters of natural gas. Between 2002 and 2007, an estimated \$20 billion has been scheduled for investment to develop these petroleum resources. Consequently, Angola was projected to surpass Algeria as the second largest oil producer in Africa after Nigeria. Petroleum production was expected to increase to 1.5 million barrels per day (Mbbbl/d) by 2005, to 1.7 Mbbbl/d by 2007, and to 2.0 Mbbbl/d by 2010 from 730,000 bbl/d in 2001 (Aremu, 2001§; Embassy of Angola, Washington, DC, 2002§). Additional information on this sector is available from the U.S. Energy Information Administration (2002§).

Outlook

The end of more than 25 years of civil war in 2002 held promise that Angola could finally begin to rebuild its society and economy. Strengthened by the very significant offshore oil discoveries since 1998, the redevelopment of Angola will be based on the development of its rich offshore petroleum endowment and, to a lesser extent, the reopening of access to its land-based diamond resources to new foreign investment. With the end of the civil war, the country may now be able to take advantage of advances in mineral exploration concepts and technology, which could help evaluate its potential for new metal mining developments, such as copper, iron ore, nickel,

and platinum-group metals. The large number of land mines that remain in place since the end of the civil war could be a restraint on geological fieldwork in some localities.

Additional information about the mineral industry of Angola can be found in the 2000 and 2001 Minerals Yearbooks, volume III, Mineral Industries of Africa and the Middle East.

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Major Sources of Information

Ministério de Geologia e Minas (Ministry of Geology and Mines)

Avenida Comandante Gika

Caixa Postal 1260

Luanda, Angola

Telephone: (244-2) 326-724 or 322-766

Fax: (244-2) 321-655 or 322-569

Ministério dos Petroleos (Ministry of Petroleum)

Avenida 4 de Fevereiro

Luanda, Angola

Tel: (244-2) 337 448/492/493

Fax: (244-2) 335 381

Empresa Nacional de Diamantes de Angola

Av. Major Kanhangulo N.o 100

Caixa Postal 1247

Luanda, Angola

Telephone: (244-2) 337-276

Fax: (244-2) 330-377

E-mail: endiama@endiama-angola.com

Internet: <http://endiama-angola.com>

Sonangol Holding (Sociedade Nacional de Combustiveis de Angola)

Rua 1º Congresso do MPLA, N.º 8 16

Caixa Postal 1316

Luanda, Angola

Telephone: (244 2) 334-448 or 331-690

Fax: (244 2) 391-782

Telex: 2089 SONANG AN

E-mail: secretariageral@sonangol.co.ao

Internet: <http://www.sonangol.co.ao>

Angolan Mining Association

Rua Cte Nzaji 7

Luanda, Angola

Tel: (244-2) 320 656

TABLE 1
ANGOLA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES ¹

Commodity		1998	1999	2000	2001	2002
INDUSTRIAL MINERALS						
Cement, hydraulic ^e	thousand metric tons	350 ²	350	350	350	350
Diamond ^{3,4}	thousand carats	2,764 ²	3,806 ²	4,313 ²	5,159	5,022 ²
Granite	thousand cubic meters	1,500	1,500	1,500	1,500	1,500
Marble	do.	100	100	100	100	100
Salt	metric tons	30,000	30,000	30,000	30,000	30,000
MINERAL FUELS AND RELATED MATERIALS						
Petroleum:						
Crude	thousand 42-gallon barrels	268,275 ²	272,300 ^r	273,000 ^{r,2}	270,100	329,600 ²
Refinery products ^{e,5}	do.	13,180 ²	14,000	14,000	14,000	14,000
Gas, natural: ^c						
Gross ⁶	million cubic meters	5,804 ²	5,800 ²	11,613 ²	-- ^{r,2}	-- ²
Dry	do.	566 ²	560 ²	560 ²	-- ^{r,2}	-- ²
Liquefied petroleum gas	thousand 42-gallon barrels	1,292 ²	1,185 ^{r,2}	1,626 ²	-- ^{r,2}	-- ²

^eEstimated; estimated data are rounded to no more than three significant digits. ^r Revised. --Zero.

¹Includes data available through November 2003.

²Reported figure.

³Did not include smuggled production.

⁴Production was approximately 90% gem and 10% industrial grade.

⁵Includes asphalt and bitumen.

⁶Angola has no natural gas distribution system; most gas was vented and flared.

TABLE 2
ANGOLA: OIL AND GAS DISCOVERIES AND PROPOSED INVESTMENT FROM 1996-2011^{1,2}

Operating company	Development	Commodity	Capacity	Investment (million dollars)	Startup date	Comments, reserves, etc.
ChevronTexaco Corp. ³	Block 0 - Cabinda	Petroleum	100,000 to 600,000 bbl/d	2,000	2006	Concession extended 2010 to 2030
Do.	Block 0 - North Nemba	do.	40,000 bbl/d		2001	
ChevronTexaco Corp. ⁴	Block 14 - Kuito	do.	80,000 bbl/d	400	2001	Discovered 1997, 400 Mbbl.
Do.	Block 14 - Kuito Phase 3 Development	do.	55,000 to 85,000 bbl/d	50	October 2001	
Do.	Block 14 - Benguela	do.				Discovered January 1998.
Do.	Block 14 - Landana	do.				Discovered October 1998.
Do.	Block 14 - Landana 2a	do.				Discovered December 2001.
Do.	Block 14 - Belize	do.				Discovered 1998.
Do.	Block 14 - Tombocco	do.				Discovered October 2000.
Do.	Block 14 - Lobito-1X	do.				Do.
Do.	Block 14 - Tombua	do.				Discovered July 2001.
Do.	Block 14 - Gabela-1	do.				Discovered July 2002.
Do.	Benguela/Belize Development	do.	140,000 bbl/d			
Do.	Block 14 - Negage	do.				Discovered December 2002.
Chevron Texaco (32%), Sonangol (20%)	Luanda LNG plant	Natural gas	5 billion cubic meters per year (4Mt/yr)	2,000	2006	Gas processing plant. Angolan natural gas reserves equal 270 billion cubic meters.
Summary				6,000	by 2006	Block 14 total = 3 Gbbl.
ExxonMobil Angola ⁵	Block 15 - Kissanje	Petroleum				Discovered 1998.
Do.	Block 15 - Marimba	do.				Do.
Do.	Block 15 - Hungo	do.				Do.
Do.	Block 15 - Dikanza	do.				Do.
Do.	Block 15 - Chocalho	do.				Discovered July 1999.
Do.	Block 15 - Xicomba	do.				Discovered September 1999.
Do.	Block 15 - Xicomba FPSO	do.	80,000 bbl/d		2003	100 Mbbl reserves.
Do.	Block 15 - Mondo	do.				Discovered June 2000.
Do.	Block 15 - Saxi-1	do.				Discovered August 2000.
Do.	Block 15 - Batuque-1	do.				Discovered November 2000.
Do.	Block 15 - Kizomba-A FPSO	do.	250,000 bbl/d	3,100	2004	Develops Hunga and Chocalho fields, 1 Gbbl reserves.
Do.	Block 15 - Kizomba-B FPSO	do.	250,000 bbl/d	3000	2006	Develops Kissanje and Dikanza fields, 1 Gbbl reserves.
Do.	Block 15 - Kizomba-C FPSO	do.			2007	Develops Bataque, Mondo, and Saxi fields.
Do.	Block 15 - Mblumbumba-1	do.				Discovered April 2001.
Do.	Block 15 - Vicango-1	do.				Discovered May 2001.
Do.	Block 15 - Mavacola-1	do.				Do.
Do.	Block 15 - Reco Reco-1	do.				Discovered September 2002.
Sonangol (50%)	Lobito refinery	Petroleum, refined	200,000 bbl/d	3,600	2006	Seeking financing in 2002.
ExxonMobil Angola ⁶	Block 24 - Semba-1	Petroleum				
Summary				NA		Block 15 - 4 Gbbl reserves.
Canadian Natural Resources Ltd ⁷	Block 16	Petroleum				
TotalFinaElf ⁸	Block 17 - Girassol FPSO	Petroleum	200,000 bbl/d	3,000	2001	Discovered 1996, 800 Mbbl.
Do.	Block 17 - Dalia	do.				Discovered 1997.
Do.	Block 17 - Dalia FPSO	do.	225,000 bbl/d	3,400	2006	
Do.	Block 17 - Rosa	do.				Discovered 1998.
Do.	Block 17 - Liro and Rosa FPSO	do.		3,000	2005	Do.
Do.	Block 17 - Tulipa	do.				Discovered June 1999.
Do.	Block 17 - Orquidea	do.				Discovered September 1999.
Do.	Block 17 - Cravo	do.				Discovered October 1999.

See footnotes at end of table.

TABLE 2--Continued
ANGOLA: OIL AND GAS DISCOVERIES AND PROPOSED INVESTMENT FROM 1996-2011^{1,2}

Operating company	Development	Commodity	Capacity	Investment (million dollars)	Startup date	Comments, reserves etc.
TotalFinaElf ⁸ --Continued	Block 17 - Camelia	do.				Discovered December 1999.
Do.	Block 17 - Jasmine	do.				Discovered 2000.
Do.	Block 17 - Perpetua 1	do.				Discovered December 2000.
Do.	Block 17 - Violeta	do.				
Do.	Block 17 - Anturio	do.				
Do.	Block 17 - Zinia-1	do.				Discovered December 2002.
Do.	Block 17 - Hortensia-1	Petroleum				Discovered March 2003.
Do.	Block 17 - Acacia	do.				Discovered March 2003.
TotalFinaElf ⁹	Block 32 - Gidungo-1	Exploration				
		October 2002				
Summary				NA		
BPAmoco ¹⁰	Block 18 - Platina	do.				Discovered 1999.
Do.	Block 18 - Plutonio	do.				Do.
Do.	Block 18 - Plutonio FPSO	do.	220,000 bbl/d		2007	To service 6 blocks, 18 fields.
Do.	Block 18 - Galio	do.				Discovered 2000.
Do.	Block 18 - Paladio	do.				Do.
Do.	Block 18 - Cromio	do.				Discovered October 2000.
Do.	Block 18 - Cobalto	do.				Discovered December 2000.
Do.	Plutonio/Cobalto FPSO		80,000+ bbl/d		2005	400 Mbbl reserves.
Do.	Galio/Cromio Development					300 Mbbl reserves.
BPAmoco ¹¹	Block 31- Plutao 1					
Summary				7,500	by 2011	6 fields, 2.4 Gbbl.
Norsk Hydro ASA ¹²	Block 34	Petroleum				
Angola total		Petroleum	2 Mbbl/d	20,000	2010	
Do.		Natural gas	5 billion cubic meters per year	2,000	2006	

NA Not available. Do Ditto. FPSO Floating production storage and offloading vessel.

¹Blank column indicates no information was available.

²Abbreviations: bbl/d, barrels per day; Gbbl, billion barrels; Mbbl, million barrels; Mt/yr, million metric tons per year.

³Block 0—Chevron Texaco (39.2%), Sonangol (41%), Elf Petroleum Angola (10%), and AGIP Angola Production (9.8%).

⁴Block 14—Cabinda Gulf Oil Co. (ChevronTexaco) (31%), Sonangol Pesquisa e Produção S.A.R.L. (20%), Agip Angola Exploration BV (20%), TotalFinaElf E&P Angola (20%), and Petrogal Exploração (9%).

⁵Block 15—ExxonMobil Angola (40%), BP Exploration (Angola) Limited (26.67%), Agip Angola Exploration B.V. (20%), and Statoil Angola (13.33%).

⁶Block 24—Esso Exploration Angola (Block 24) Limited (50%), Sonangol (20%), Petronas Carigali Overseas SDN BDH (15%), and Ocean Angola Corporation (15%).

⁷Block 16—Canadian Natural Resources Ltd. (50%), Odebrecht Oil & Gas (30%), and Sonangol (20%).

⁸Block 17—TotalFinaElf (35%), ExxonMobil (20%), Sonangol (20%), BP Amoco (6.67%), Den Norske State Oljeselskap a.s. (Statoil) (13.33%), Norsk Hydro ASA (10%), and Petrofina 5%.

⁹Block 32—TotalFinaElf (30%), Sonangol (20%), Prodev (20%), ExxonMobil (15%), Marathon (10%), and Petrogal (5%).

¹⁰Block 18—Amoco Angola B.V. (a wholly owned subsidiary of BP) (50%), and Shell Development Angola B.V. (50%).

¹¹Block 31—BP (26.7%), ExxonMobil (25%), Statoil (13.3%), Marathon (10%), TotalFinaElf (5%), and Sonangol, (20%).

¹²Block 34—Sonangol (20%), Norsk Hydro (30%), Phillips Petroleum (20%), Shell (15%), and Petrobras (15%).

Source: U.S. Geological Survey compilation from published company and Angolan Government data available through October 2003.