

2014 Minerals Yearbook

MALI AND NIGER

THE MINERAL INDUSTRIES OF MALI AND NIGER

By Omayra Bermúdez-Lugo

MALI

Mali's economy continued to be largely dependent on gold exports, which historically have accounted for the majority of the country's total export earnings from mining. In addition to gold, Mali also produced small amounts of colored gemstones, diamond, iron ore, phosphate rock, rock salt, sand and gravel, and silver (as a byproduct of gold mining), but information was inadequate to make reliable estimates of output. Mali's undeveloped mineral resources included bauxite, chromium, copper, granite, gypsum, iron ore, kaolin, lead, lithium, manganese, marble, nickel, niobium, palladium, phosphate rock, rutile, silver, talc, thorium, tin, titanium, tungsten, uranium, and zirconium.

Minerals in the National Economy

In 2014, tax revenue from the gold industry was estimated to have accounted for 1.8% of the country's gross domestic product and for about 10.2% of total Government revenue, compared with 2.1% and 13.2%, respectively, in 2013. Gold exports were estimated to have accounted for nearly 67% of total exports in 2014 compared with nearly 68% in 2013. Mali's mineral sector was regulated by law No. 2012–015 of February 27, 2012 (International Monetary Fund, 2015, p. 24, 26, 28).

Production

Gold produced from industrial mining operations decreased by about 4% to 39,724 kilograms (kg) in 2014 compared with a revised 41,392 kg in 2013; this total did not include gold produced by artisanal miners. Gold output from artisanal mining operations was estimated to be 6,000 kg in 2013; information on gold produced by artisanal miners in 2014 was unavailable. Data on mineral production are in table 1.

Structure of the Mineral Industry

Mining operations in Mali were privately owned. The Government held a minority interest in all gold mining ventures. Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Gold.—Industrial gold production in Mali came from seven mines, which included the Kalana Mine, the Loulo-Gounkoto Mine complex, the Morila Mine, the Sadiola Mine, the Syama Mine, the Tabakoto-Segala Mine complex, and the Yatela Mine. Mining operations at the Yatela Mine ceased in 2013; however, stockpiled ore continued to be processed. In 2014, the Yatela Mine produced an estimated 600 kg of gold.

Avnel Gold Mining Ltd. of the United Kingdom operated the Kalana underground mine. Underground gold resources at the Kalana Mine were expected to be depleted by the third quarter of 2015. Upon depletion, the company planned to continue to process stockpiled ore, which was expected to be depleted by the third quarter of 2016. Avnel reported commissioning a mineral resource estimate and a preliminary economic assessment study at the Kalana Mine in 2014 to study the possibility of developing an open pit gold mine. The studies, which were carried out by Australia-based Snowden Mining Industry Consultants Pty Ltd. and upgraded in September 2014, showed indicated resources of 13.6 million metric tons (Mt) at an average grade of 4.36 grams per metric tons (g/t) gold and inferred resources of 0.7 Mt at an average grade of 4.24 g/t gold. As of yearend, Avnel was in the process of completing a prefeasibility study for the project (Avnel Gold Mining Ltd., 2014a, b).

Late in the year, a drilling program that sought to identify new economic gold resources to mine at the Loulo Mine was launched at the Loulo-Gounkoto Mine complex. In 2014, probable ore reserves from the Loulo-Gounkoto Mine's Baboto deposit were upgraded to 2.2 Mt at an average grade of 2.1 g/t gold. These new gold reserves were expected to partly offset the decrease in total mineral reserves at the Loulo Mine. Total gold production from the Loulo-Gounkoto Mine complex increased by 10% in 2014 to 19,882 kg from 18,051 kg in 2013. The Loulo Mine produced nearly 60% of the complex's total production or about 12,000 kg of gold, and the Gounkoto Mine produced 7,992 kg. Randgold Resources Ltd. of the United Kingdom invested \$142.6 million in the development of the Yalea and Gara underground deposits, which were commissioned during the year (Randgold Resources Ltd., 2015, p. 31-39).

In 2014, the Loulo Mine employed a total of 2,861 people, 93% of whom were Malian nationals. A feasibility study to assess the Gounkoto Mine's underground gold resources was completed during the year. The study outlined additional underground probable reserves of 4.7 Mt at an average 6 g/t gold. Once developed, Randgold expected these reserves to increase gold production at the Loulo-Gounkoto Mine complex to an average of more than 18,600 kilograms per year (kg/yr) and to extend the life of the complex to 2024. A drilling program conducted in the vicinity of the underground project also highlighted the potential for additional underground resources, which were to be evaluated in 2015. In 2014, the Gounkoto Mine employed a total of 1,013 people, 97% of whom were Malian nationals (Randgold Resources Ltd., 2015, p. 31–39, 129).

The Morila Mine's main ore body was depleted in 2009. In 2014, gold produced at the mine was from stockpiled ore, pushback ore (subpits designed to generate a mine's optimal pit limits and extraction sequence), and material from the tailings storage facility. The mine produced a total of 3,430 kg in 2014

MALI AND NIGER—2014 28.1

compared with 4,411 kg in 2013. In 2014, the Morila Mine employed a total of 1,280 people, 99% of whom were Malian nationals. Randgold, which operated the mine, planned to begin recovering gold from stockpiled fine carbon in 2015 (Randgold Resources Ltd., 2015, p. 41–45).

The Sadiola Hill Mine produced a total of 6,407 kg of gold in 2014 compared with 6,532 kg in 2013. The 2% decline in output was attributed to the mining of lower grade ore. Oxide ore reserves at Sadiola Hill were expected to be depleted by 2015–16. IAMGOLD Corp. of Canada, which held a 41% interest in the mine in joint venture with AngloGold Ashanti Ltd. of South Africa (41%) and the Government (18%), reported that it was in negotiations with its joint-venture partners to evaluate the possibility of developing the mine's deep sulfide reserves in order to extend the life of the mine beyond 2015–16 (IAMGOLD Corp., 2015, p. 33, 53–58).

Gold production from the Syama Mine decreased by 15.6% in 2014 to 5,147 kg compared with 6,102 kg in 2013. The decrease in production was attributed to a reduction in mill throughput resulting from planned maintenance shutdowns during the year. The construction of an oxide circuit, in addition to higher sulfide throughput, was expected to increase production by an additional 2,200 kg of gold in 2015. A drilling program to upgrade economic underground resources at Syama was also planned for 2015 (Resolute Mining Ltd., 2015, p. 5, 13).

Endeavour Mining Corp. continued to work on the expansion of production at the Tabakoto-Segala Mine complex. The complex included the Djambe and the Kofi open pit mines, the Tabakoto and Segala underground mines, and the Tabakoto mill. Production at the Tabakoto-Segala Mine increased by about 1.7% in 2014 to 3,960 kg compared with 3,895 kg in 2013. Production from the Djambe mine ceased at the end of the fourth quarter. The rampup of production at the Segala underground mine, which was expected to improve ore feed to the Tabakoto mill, was underway as of yearend (Endeavour Mining Corp., 2015, p. 6, 11–12).

In July, Gold Fields Ltd. of South Africa sold its 85% interest in the Yanfolila Mine to Hummingbird Resources plc of the United Kingdom. Hummingbird planned to begin the construction of mining-related infrastructure in April 2015, and to commission the Yanfolila Mine during the first half of 2016. The mine was expected to produce about 3,100 kg/yr of gold during the first year of production. Life-of-mine average gold production was estimated to be about 2,500 kg/yr. Total indicated and inferred mineral resources at Yanfolila were estimated to be 20 Mt at a grade of 2.8 g/t gold. Hummingbird was to operate the mine through its subsidiary Hummingbird Yanfolila Resources SARL (Gold Fields Ltd., 2015, p. 58; Hummingbird Resources plc, 2015, p. 2–3).

Industrial Minerals

Phosphate Rock.—Great Quest Fertilizer Ltd. of Canada (formerly known as Great Quest Metals Ltd.; name changed June 3, 2014) planned to restart phosphate rock exploration activities at the Tilemsi project in northern Mali. The project, which consisted of three adjacent properties prospective for phosphate rock known as Aderfoul, Tarkint Est, and Tilemsi,

had been put on hold in 2012 owing to civil unrest in the country. As of yearend, Great Quest reported paying a total of \$209,485 to Engrais Phosphates du Mali S.A. (EPM) as part of its contractual obligations to complete the acquisition of a 94% share in EPM (Great Quest Fertilizer Ltd., 2015, p. 17–18).

Outlook

Mali was likely to remain vulnerable to fluctuations in the international price of gold. The depletion of gold reserves at the Morila and Yatela Mines and the soon-to-be-depleted gold reserves at the Kalana and Sadiola Mines would likely affect mineral sector growth and, hence, Government proceeds from the sector in the short run. Production from the expected commissioning of the Yanfolila Mine in 2016, the planned rampup of existing gold mining operations, and the active search for new economic gold resources may partly help to counterbalance the loss of production from the depletion of these mines. The decline in the international price of petroleum could benefit Mali's economy as a whole as the country depended on petroleum imports to meet its domestic needs. In the long run, as gold mines mature and reach depletion, Mali would likely have to diversify its mineral production portfolio away from gold in order to grow its mineral sector.

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NIGER

Niger was among the world's leading producers of uranium. Other mineral commodities produced in the country included cement, coal, crude petroleum, gold, gypsum, limestone, petroleum refinery products, salt, silver, and tin.

Minerals in the National Economy

In 2014, Niger was the world's fourth-ranked producer of uranium, by tonnage, accounting for about 7% of world production. Uranium was estimated to have accounted for about 32% of the country's total export revenue in 2014 compared with about 39% in 2013. Petroleum exports were estimated to have accounted for about 26% of total export revenue in 2014 compared with about 25% in 2013. Niger's nonfuel mineral sector was regulated by law No. 2006–26 of August 9, 2006, and its petroleum sector by law No. 2007–01 of January 31, 2007 (International Monetary Fund, 2015, p. 31; World Nuclear Association, 2015).

Production

Production of most mineral commodities in Niger, with the exception of coal, decreased during the year. Cement production decreased by about 28% in 2014 to 21,052 t; gold, by 36% to 732 kg; crude petroleum, by about 4% to 6.3 million barrels; and uranium, by 9% to 4,800 t. Coal production increased by about 6% to 255,936 t from 241,792 t in 2013. Production was estimated for salt, silver, and petroleum refinery products. Data on mineral production are in table 1 (Institut National de la Statistique, 2015, p. 39).

Structure of the Mineral Industry

Cement, petroleum, petroleum refining, phosphate rock, and uranium operations were privately owned. Coal and gold mining operations were owned by the Government. Salt mining was carried out by artisanal miners. Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Gold.—The Samira Hill Mine was the only industrial gold mining operation in Niger. The Government owned 100% interest in the mine through Société de Patrimoine des Mines du Niger S.A. (SOPAMIN). The National Institute of Statistics reported production from Samira Hill Mine to be 668 kg in 2014 compared with 1,077 kg in 2013, and artisanal gold production to be 64 kg compared with 73 kg in 2013.

Mineral Fuels and Related Materials

Petroleum.—Production of crude petroleum in Niger was from the Agadem oilfield, which was operated by China National Petroleum Corp. (CNPC). In 2014, CNPC reported that significant progress had been made in the exploration of the Agadem Block; however, the details of such progress were not available in the company's 2014 annual report or press releases. CNPC also operated Soraz, the country's only petroleum refinery. In 2012, the Government had awarded nine petroleum exploration contracts to several international companies, including International Petroleum Ltd. of Australia; Nigerian companies Advantica Gas and Energy, Labana Petroleum Ltd., and Sirius Energy Resources; and Bermuda-registered Genmin Ltd. In 2013, International Petroleum was granted an exclusive exploration license for the Aborak, the Manga 1, the Manga 2, and the Tenere Ouest Blocks in southeastern Niger. The license, which was valid for 4 years and could be renewed twice for a period of 4 years each time, required that the company deliver a minimum work program, which included conducting a gravity and magnetic survey for the blocks, reprocessing and reinterpreting seismic data, acquiring and interpreting twodimensional seismic data, and carrying out exploration well drilling. In 2014, a reconnaissance survey was carried out for the blocks, and the company planned to complete gravity and magnetic survey studies for the blocks during the third quarter of 2015. Information on the status of the other petroleum exploration projects was unavailable (China National Petroleum Corp., 2015, p. 29; International Petroleum Ltd., 2015, p. 5).

In 2012, the Government had signed an agreement with the Government of Chad for the construction of a 600-kilometerlong crude petroleum pipeline that would connect the Agadem oilfield to an existing pipeline that was jointly owned by Cameroon and Chad. The construction of the pipeline was delayed in 2014 owing to technical and environmental issues. Niger planned to export about 60,000 barrels per day of crude petroleum through the proposed pipeline to the Port of Kribi in Cameroon (International Monetary Fund, 2015, p. 15).

Uranium.—Areva Group of France operated the Compagnie Miniére d'Akouta (COMINAK) and the Société des Mines de l'Aïr (SOMAIR) uranium mines. Areva's COMINAK and SOMAIR mining licenses had expired on December 31, 2013. As of yearend 2013, Areva and the Government were unable to reach mutually agreeable terms regarding new tax provisions under the contract and negotiations were protracted. A new mining contract, based on Niger's 2006 Mining Law, was eventually signed in May 2014. The contract included a new provision stipulating the potential increase of the company's royalty rate to 12% from 5.5%, depending on profitability, and the requirement to appoint Nigerien nationals as managing directors of SOMAIR in 2014 and COMINAK in 2016. Areva was also to partially finance the construction of a road from the city of Tahoua to the town of Arlit in the Agadez region. Areva, which in 2009 had also been granted a mining license for the development of the Imouraren uranium project, announced that the project was placed on care-and-maintenance status in 2014

MALI AND NIGER—2014 28.3

owing to the decrease in the international price of uranium (Areva Group, 2014; 2015, p. 30, 57).

Outlook

Niger's mineral sector is likely to be affected by the decrease in the price of its two key mineral commodities, petroleum and uranium, and by the shutdown of the SORAZ petroleum refinery.

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TABLE 1
MALI AND NIGER: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Country and co	2010	2011	2012	2013	2014	
MALI ²	3,3					
Gold, mine output, Au content ⁴	kilograms	38,563	38,208	41,016	41,392 ^r	39,724
NIGER ⁵						
Cement, hydraulic		32,008	72,510	72,511 ^r	29,135 ^r	21,052
Coal, bituminous		246,558	246,016	235,072	241,792	255,936
Gold, mine output, Au content ⁶	kilograms	1,950	1,957	1,677 ^{r, 7}	1,150 ^{r, 7}	732 7
Gypsum		7,559	6,058	600		
Limestone		23,152				
Salt ^e		30,000	30,000	30,000	30,000	30,000
Silver, mine output, Ag content	kilograms	326	197	329	300 e	300 ^e
Petroleum:						
Crude ⁶	thousand 42-gallon barrels		680	4,642	6,498	6,256
Refinery products ⁶	do.		459	4,550	6,335	5,800 °
Tin, mine output, Sn content		6 8	10 8			
Uranium, U ₃ O ₈ content		4,900	5,100	5,500	5,300	4,800

^eEstimated; estimated data are rounded to no more than three significant digits. ^rRevised. do. ditto. -- Zero.

¹Table includes data available through December 22, 2014.

²In addition to the commodities listed, small amounts of colored gemstones (amethyst, epidote, garnet, prehnite, and varieties of quartz), diamond, iron ore, phosphate rock, sand and gravel, salt, and silver (as a byproduct of gold mining) were produced in Mali, but available information was inadequate to make reliable estimates of output.

³Information on phosphate rock output, which had been estimated to be 1,600 metric tons (t) in 2010, 18,000 t in 2011, and 20,000 t in 2012 and 2013, was unavailable in 2014.

⁴Excludes artisanal gold production, which was estimated to be more than 5,000 kilograms (kg) in 2010, and more than 6,000 kg from 2011 through 2013.

⁵In addition to the commodities listed, phosphate rock, sulfuric acid produced from imported sulfur, tungsten ore, and a variety of construction materials (clays, sand and gravel, and stone) were produced in Niger, but available information was inadequate to make reliable estimates of output.

⁶Includes artisanal and small-scale production of gold, which was reported to be 354 kilograms (kg) in 2010, 481 kg in 2011, 113 kg in 2012, 73 kg in 2013, and 64 kg in 2014.

⁷Reported by Institut National de la Statistique.

⁸Production of tin was by artisanal miners.

${\it TABLE~2}$ MALI AND NIGER: STRUCTURE OF THE MINERAL INDUSTRIES IN 2014

(Metric tons unless otherwise specified)

Country and commodity		Major operating companies and major equity owners	Location of main facilities ¹	Annual capacity
M	ALI	_		
Gold	kilograms	Artisanal miners	Kenieba Valley	5,000
Do.	do.	Endeavour Mining Corp., 80%, and Government, 20%	Tabakoto-Segala Mine complex, Kenieba Valley	4,600
Do.	do.	Morila Ltd. (AngloGold Ashanti Ltd., 40%; Randgold Resources Ltd., 40%; Government, 20%)	Morila Mine, 280 km southeast of Bamako	4,500
Do.	do.	Sadiola Exploration Company Ltd. (AngloGold Ashanti Ltd., 40%; IAMGOLD Corp., 40%; Government, 20%)	Yatela Mine, ² 50 km southwest of Kayes	2,100
Do.	do.	Société d'Éxploitation des Mines d'Or de Sadiola S.A. (AngloGold Ashanti Ltd., 41%; IAMGOLD Corp., 41%; Government, 18%)	Sadiola Hill Mine, 77 km south of Kayes	7,000
Do.	do.	Société d'Éxploitation des Mines d'Or de Kalana S.A. (Avnel Gold Mining Ltd., 80%, and Government, 20%)	Kalana Mine, 300 km south of Bamako	900
Do.	do.	Société des Mines de Loulo S.A. (Somilo) (Randgold Resources Ltd., 80%, and Government, 20%)	Loulo-Gounkoto Mine complex, 350 km west of Bamako	21,000
Do.	do.	Société des Mines de Syama S.A. (Resolute Mining Ltd., 80%, and Government, 20%)	Syama Mine, 300 km southeast of Bamako	7,800
Phosphate rock		Toguna S.A. (Toguna Groupe, 100%)	Tilemsi, northern Mali	140,000
	GER			•
Cement		Société Nigérienne de Cimenterie (Damnaz Cement Company Ltd.)	Malbaza Uzine, southwestern Niger	80,000
Coal		Société Nigérienne de Charbon (SONICHAR)	Anou Araren, central Agadez region	300,000
Gold	kilograms	Société de Patrimoine des Mines du Niger S.A. (SOPAMIN) (Government, 100%)	Samira Hill Mine, 90 km west of Niamey	3,000
Petroleum	thousand 42-gallon barrels per day	China National Petroleum Corp., 60%, and Government, 40%	Agadem oilfields	20,000
Petroleum refinery products	do.	do.	Soraz refinery, city of Zinder, 900 km east of Niamey	20,000
Phosphate rock	do.	Toguna Agro-Industries SA	Tilemsi Valley, northeastern Mali	20,000
Salt		Artisanal mining	Bilma salt pans, Tenere Desert, northern Niger	33,000
Uranium		Compagnie Minière d'Akouta (COMINAK) [Areva Group, 34%; Société de Patrimoine des Mines du Niger S.A. (SOPAMIN), 31%; Overseas Uranium Resources Development Co., 25%; ENUSA Industrias Avanzadas S.A., 10%]	Akouta underground mine, northern Niger	2,000
Do.		Société des Mines de l'Aïr (SOMAIR) [Areva Group, 63.4%, and Société de Patrimoine des Mines du Niger S.A. (SOPAMIN), 36.6%]	Arlit open pit mine, 6 km northwest of Arlit, Agadez region	3,000
Do.		Société des Mines d'Azelik S.A.	Azelik Mine	700
Do. do Ditto		Societe des Ivilles d'Azella S.A.	AZCIIK IVIIIC	700

Do. do. Ditto.

MALI AND NIGER—2014 28.5

¹Abbreviations used for units of measure are as follows: km, kilometer.

²Mining operations at the Yatela Mine ceased in 2013; however, stockpiled ore continued to be processed.