



2011 Minerals Yearbook

MAURITANIA

THE MINERAL INDUSTRY OF MAURITANIA

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Mauritania occupies an area of more than 1 million square kilometers (km²) and has a population of 3.4 million. The country's geology includes four major units: the Reguibat shield in the north, which includes the Archean rocks and the Paleoproterozoic Birimian succession that hosts major iron ore and gold deposits; the Mauritanides belt in the south-central region, which trends northwest to southeast along the West African craton and holds the Guleb Moghrein copper-gold deposit; the coastal basin, which has Paleozoic to Cenozoic sedimentary formations and hosts phosphate rock and petroleum deposits; and the Taoudeni basin in the east-central region, which is one of the largest Proterozoic to Paleozoic sedimentary formations in Africa and contains base-metal mineralization (Ministry of Industry and Mines, 2008; Office National de la Statistique, 2012).

In 2011, Mauritania was the second ranked producer of iron ore in Africa after South Africa and the world's 15th ranked producer in terms of the tonnage of its iron ore production. In addition to iron ore production, which has been a major component of the country's mineral industry since the late 1950s, Mauritania produced cement, copper, crude oil, gold, gypsum, quartz, salt, and steel (table 1; Jorgenson, 2012).

Minerals in the National Economy

The Mauritanian economy grew in real terms (1998 prices) at a rate of 4.0% in 2011 compared with a revised growth rate of 5.1% in 2010. The value of mining sector activity, which included production of copper, crude oil, gold, and iron ore, accounted for 37.9% of the country's nominal gross domestic product (GDP) in 2011 compared with 32.5% of the GDP in 2010 and 23.3% of the GDP in 2009. Iron ore exports, which accounted for 53% of the country's total exports, increased by about 48% to \$1,471 million from \$997 million in 2010; gold exports increased by 30% to \$404 million from \$310 million in 2010; copper exports increased by about 25% to \$234 million from \$187 million in 2010; and crude oil exports decreased by about 26% to \$221 million from \$297 million in 2010. About 54% of Mauritania's iron ore exports went to Europe, and the remaining 46% was shipped to China (Banque Centrale de Mauritanie, 2012, p. 29–30, 99–101).

Government Policies and Programs

The Ministère de l'Industrie et des Mines [Ministry of Industry and Mines] and the Ministère du Pétrole et de l'Énergie [Ministry of Petroleum and Energy] are the Government agencies responsible for regulating mineral industry activity. The Direction des Mines et de la Géologie [Department of Mines and Geology] implements the Government policies to enhance foreign investment in the mining sector of Mauritania. The Code Minier [Mining Law] awards exploration permits

on a "first come, first served" basis for a 3-year period that can be renewed twice for up to 3 years each time. Mining licenses are awarded for a 30-year period and are renewable for up to 10 years. The law exempts mining companies from customs duties for exploration equipment during the first 5 years of production and permanently on fuel and spare parts. The tax code includes a 25% corporate income tax rate after a tax exemption for the first 3 years of production; a tax withholding rate of 14% on repatriated earnings; a 16% value-added tax; and royalties that range from 1.5% to 5%, depending on the value of the product. L'Unité du Cadastre Minier (the Mining Cadastre Unit) manages the exploration licensing and mining rights issuance process by offering four classes of titles: reconnaissance licenses, 3-year exploration permits, small-scale mining permits, and 30-year mining licenses (Ministère du Pétrole et de l'Énergie et des Mines, 2012).

In 2011, the Government approved several amendments to its Hydrocarbon Code and Mining Code. The revisions to the Mining Code change the method by which royalties are calculated and the area of land that is assigned for exploration permits. Revisions to the mining law added a 10% tax on all mining transactions and based the royalty on international prices instead of having it be a fixed percentage. The area of land allocated for each exploration permit was reduced to 500 km² from 1,000 km² for all minerals except for the areas allocated for diamond concessions, which remain at 5,000 km² (Marouf, 2011).

Production

In 2011, salt production increased by about 77% compared with that of 2010. Gypsum and copper output increased by about 11% and 8%, respectively, compared with that of 2010. The output of iron ore and gold decreased slightly, by 3% and about 2%, respectively (table 1).

Structure of the Mineral Industry

In 2011, more than 50 international companies were involved in exploration and exploitation of minerals in Mauritania. Société Nationale Industrielle et Minière (SNIM) was a majority state-owned mining company (78.35% interest) that contributed 53% of the country's total exports, 20% of the Government's revenue, and 35% of the GDP. SNIM operated iron ore mines at Guelb el Aouj, Guelb el Rhein, M'Haoudat, and Zouerate in northern Mauritania. SNIM also owned and operated a 700-kilometer (km) heavy-haul railway and a shipping terminal at Nouadhibou Port on the Atlantic coast (Total Mining, 2012).

Tasiast Mauritanie Ltd. S.A. (a wholly owned subsidiary of Kinross Gold Corp. of Canada) and Mauritanian Copper Mines S.A. (a wholly owned subsidiary of First Quantum Minerals Ltd. of Australia) were the only two companies that produced

gold in Mauritania in 2011. Mauritanian Copper Mines also produced copper. Petroliam Nasional Berhad (Petronas) was the country's only producer of crude oil; its production was from the Changuetti offshore field. Other mineral production companies included Ciment de Mauritanie S.A. and Mauritano-Française des Ciments S.A., which produced cement, and Société Mauritanienne des Industries du Sel (SOMISEL), which produced salt (table 2).

In 2011, several companies explored for uranium in Mauritania. These companies included Agrineq S.A., Aura Energy Ltd., and Forte Energy NL (all of Australia), Alba Mineral Resources Plc. and Alecto Minerals Plc. (both of the United Kingdom), and Earthstone Resources Ltd. of Indonesia. Additionally, three domestic companies were engaged in uranium exploration—Lusitania Uranium Mauritania, Mauritania Resources Ltd., and Orecorp Mauritania S.A.R.L. The Government awarded an exploration license for titanium and zirconium in the northern El Abiod area to Mineralis S.A.R.L.

Commodity Review

Metals

Copper.—The Guelb Moghrein Mine was the main copper mine in Mauritania. The open pit mine, which employed 1,541 persons in 2011, is located near Akjoujt (about 250 km northeast of Nouakchott) and was owned and operated by Mauritanian Copper Mines. The mine produced about 35,281 metric tons (t) of copper in concentrate in 2011, which was about 5% less than in 2010. Mauritanian Copper Mines produced 3.6 million metric tons (Mt) of ore. As of yearend 2011, First Quantum estimated the total mineral reserve at the Guelb Moghrein Mine to be 32 Mt of ore at a cutoff grade of 1.09% copper and 0.79 gram per metric ton (g/t) gold. The company was exploring for copper in the vicinity of the mine to extend the mine's life and was improving copper recovery. The capacity of the mine was 3.8 million metric tons per year (Mt/yr) of ore and 41,000 metric tons per year (t/yr) of contained copper (First Quantum Minerals Ltd., 2012).

Gold.—Kinross, which acquired Red Back Mining's assets in Mauritania in September 2010, identified the Tasiast Gold Mine as the focus of its operations in the country and conducted studies to expand the open pit mine, which is located in northwestern Mauritania. In 2011, the mine produced 6,239 kilograms (kg) of gold compared with 5,765 kg of gold in 2010. As of yearend 2011, estimates of proven and probable mineral reserves at the Tasiast deposit were 128.9 Mt at a grade of 1.80 g/t gold (about 7.5 million troy ounces). The measured and indicated resources were estimated to be 403.2 Mt at a grade of 0.86 g/t gold (11.1 million troy ounces), and the inferred resources were about 78.2 Mt at a grade of 0.74 g/t gold (about 1.9 million troy ounces). Kinross carried out an intensive \$55 million exploration drilling program at the Tasiast area, which included additional infill drilling, and increased the number of drill rigs to 25 (Kinross Gold Corp., 2012).

Mauritanian Copper Mines produced 1,951 kg of gold at the Guelb Moghrein copper-gold mine compared with 2,550 kg

in 2010. As of yearend 2011, updated mineral reserves at the Guelb Moghrein deposit were 12.5 Mt of proven ore reserves grading 0.80 g/t gold (about 321,000 troy ounces) and 19.6 Mt of probable ore reserves grading 0.78 g/t gold (about 492,000 troy ounces) (First Quantum Minerals Ltd., 2012).

Gryphon Minerals Ltd. of Australia acquired the Akjoujt, the Saboussiri, and the Tijirit exploration permits through the acquisition of Shield Mining Ltd. in October 2010. The Akjoujt copper-gold project was wholly owned by Gryphon and covered an area of approximately 750 km² located 30 km west of the Guelb Moghrein gold and copper mine. The Guelb Moghrein mineralization was classified as an iron-oxide copper-gold deposit that had carbonate and magnetite alternation. Geophysical surveys for the Akjoujt project were carried out on the project area and targeted both copper and gold mineralization. The company identified some anomalies and planned followup studies in 2012. The Saboussiri gold-copper permit covers approximately 1,000 km² in the southern Mauritanides near the border with Senegal. Gryphon held 60% interest in the project, and the remainder was held by an independent private third party. Gryphon identified several copper prospects on the project area, including a drill-ready copper and gold target at the Diaguili site and a strong gold anomaly at Toumbou. The company planned to conduct additional geochemical, geographic, and geologic studies to help define drill targets for the coming year. The Tijirit gold project is located in northwestern Mauritania in a gold district that includes the Tasiast gold deposit. The project, which was wholly owned by Gryphon, encompassed continuous exploration licenses covering an area of about 1,400-km² area (Gryphon Minerals Ltd., 2012, p. 25–26).

Iron Ore.—In 2011, Mauritania had four iron ore mines in operation. The Government expected that five more mines would become operational in the next 5 years. SNIM, which was the world's seventh ranked seaborne exporter of iron ore, was the sole iron ore producer in Mauritania in 2011. The company produced 11.2 Mt of iron ore in 2011, which was 2.8% less than in 2010. The company had set a production target of 18 Mt/yr by 2016. To achieve this goal, SNIM borrowed \$710 million in loans from international financial institutions, including a \$175 million loan from the African Development Bank, to increase the production capacity at its existing iron mines. The loans would cover the cost of expanding the existing Guleb el Rhein Mine, Kedia d'Idjill Mine, and M'Haoudat Mine and of constructing a new beneficiation plant at the Guelb el Rhein Mine that would have the capacity to produce 4 Mt/yr of concentrated iron ore. The loans would also pay for the construction of a new ore-carrier port next to the existing port at Nouadhibou to enable handling of 170,000-t-capacity ships in the first phase and 250,000-t-capacity ships in the second phase, as well as for upgrading the 700-km iron ore railway between the mines and the port (Australia's Paydirt, 2011; Société Nationale Industrielle et Minière, 2012, p. 14).

In 2011, Xstrata plc of Switzerland completed the acquisition of 87% of Sphere Minerals Ltd. of Australia, which owned 100% of the Askaf and the Lebthania iron ore projects, as well as 50% of the Gulb El Aouj iron ore project, with SNIM. As of yearend 2011, the Askaf project was at the feasibility stage,

the Gulb El Aouj was at the feasibility study review stage, and the Lebthania project was at the prefeasibility stage. PT Bumi Resources Minerals Tbk of Indonesia planned to begin iron ore production at its mine at the Tamagot site in the first quarter of 2012 (PT Bumi Resources Minerals Tbk, 2012, p. 57; Xstrata plc, 2012, p. 39, 59).

Other companies that held iron ore exploration licenses in Mauritania included ArcelorMittal of Luxembourg, Minmetals Corp. of China, PT Bumi Resources Minerals Tbk of Indonesia, and Wadi Al Rawda Industrial Developments LLC of the United Arab Emirates (Total Mining, 2012).

Societe Miniere d'Afrique du Sud et de l'ouest (SOMASO S.A.), which was a joint venture of Transafrika Resources Ltd. (70% interest) and Agrineq SA. (30% interest), was conducting a resource definition and feasibility study for the Kaouat iron ore project (prospecting permit 273B1), which is located 255 km northeast of Nouakchott. Transafrika estimated the project's in situ iron mineralization to be 1.2 billion metric tons (Total Mining, 2012; TransAfrika Resources Ltd., 2012, p. 2–3)

Industrial Minerals

Phosphate Rock.—Mauritania's first phosphate rock mine, which is located in the Bofal-Loubeira area in southwestern Mauritania, was being developed by Bofal Indo Mining Co. S.A. of India. The company expected to produce 1 Mt/yr of phosphate rock and to build a processing plant to produce phosphoric acid by 2015 (Marouf, 2010).

Quartz.—Mauritania Minerals Co. (MMC) was expected to start production of quartz at the Oum Agueineina Mine, which is located about 150 km from Nouadhibou Port, in 2011. The quartz mine was owned by MMC (90%) and the Government (10%) and had the capacity to produce 300,000 t/yr. MMC, which was awarded a license for the establishment of the first quartz operation in Mauritania, estimated that the Oum Agueineina deposit to contain 70 Mt of quartz (Feytis, 2010).

Mineral Fuels and Related Materials

Natural Gas and Petroleum.—The Government granted seven oil exploration permits in 2011. In November, Tullow Oil plc of the United Kingdom signed an agreement with the Government to explore for and exploit crude oil in Block C–10. The company planned to build a natural gas pipeline, which would be the first in the country, to carry natural gas from the Banda gasfield to Nouakchott. Production of natural gas was expected to commence by early 2015. In December, Total E&P of France signed two exploration and production contracts for oil and gas with the Government on Block C–9 in the deep offshore area and Block A–29 for the Taoudenni Basin (AME Trade Ltd., 2012; Marouf, 2012).

PC Mauritania I Pty. Ltd. and PC Mauritania II B.V. were subsidiaries of PETRONAS International Corporation Ltd. of Malaysia, which operated the offshore Chinguetti oilfield. The oilfield produced 2.8 million barrels (Mbbbl) of crude oil in 2011 compared with 3.0 Mbbbl in 2010 (table 1).

Uranium.—Forte Energy, which held 10 uranium exploration licenses that covered 9,925 km² in the Zedens region in northern Mauritania, conducted vehicle-based radiometric surveys and very-low-frequency electromagnetic surveys at the Bir En Nar prospect and at several anomalies identified near Bir Moghrein. In February, the company renewed a 5,400-meter (m) diamond drilling program at the Bir En Nar permit after completing a 4,000-m reverse-circulation drilling program. The company reported the indicated and inferred mineral resource estimates for the Bir En Nar prospect to be 1.33 Mt containing 704 parts per million (ppm) uranium oxide (U₃O₈) for about 936.4 t of contained U₃O₈ (reported as 2.06 million pounds) at a cutoff grade of 100 ppm.

Forte Energy began another reverse-circulation drilling program, focusing on Anomaly 238 (A238), which is located 55 km southeast of Bir Moghrein, and the Tamreikat prospect, which is located 40 km north of A238. The company revised its estimate for the inferred mineral resource at A238 to 45.2 Mt at a cutoff grade of 235 ppm U₃O₈ for 10,636 t of contained U₃O₈ (reported as 23.4 million pounds) at a cutoff rate of 100 ppm (Forte Energy N.L., 2012).

Aura Energy Ltd. of Australia explored for uranium at two locations in Mauritania—the Reguibat craton, which covers an area of about 8,400 km² in northern Mauritania, and the Fai, which is located in the Mauritanide fold belt in central Mauritania and covers a 2,900-km² area. Aura Energy wholly owned eight uranium exploration permits and a 70% interest in two other permits in Mauritania in joint venture with Ghazal Minerals Ltd. Aura completed a drilling program in February. The program included drilling 2,022 holes at the Reguibat project in 2011. The company completed a geophysical survey on the project's eastern permits in late 2011. In July, Aura estimated the inferred resource for the Reguibat project to be 22,818 t (reported as 50.2 million pounds) containing 330 ppm U₃O₈ at a cutoff grade of 100 ppm U₃O₈. Results confirmed extensive calcrete uranium mineralization and the presence of one of the world's larger calcrete uranium resources in Reguibat Province (Aura Energy Ltd., 2012).

Alecto Minerals plc held two uranium licenses at the 888-km² Mreiti site and the 704-km² Wad Mourkba site, which were located in the Archean shield near the northern border with the Taoudeni sedimentary basin. The company put exploration at the Mreiti and the Wad Mourkba sites on hold to concentrate its efforts and resources on its gold and base-metal projects in Mauritania (Alecto Minerals Plc, 2012).

Outlook

The mineral industry of Mauritania is expected to grow significantly in the near future with the entry of major mining companies, such as Gryphon, Kinross, and Xstrata, into the country's mining sector. SNIM plans to increase its iron ore production from 11.2 Mt/yr in 2011 to 18 Mt/yr by 2016. The country's capacity to export minerals, including iron ore, is expected to increase significantly when the construction of a second loading wharf at the Port of Nouadhibou on the Atlantic coast is completed in 2012.

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TABLE 1
MAURITANIA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2007	2008	2009	2010	2011
METALS					
Copper in concentrate	28,700 ^{r,3}	33,073	36,600 ^{r,3}	37,000	39,900
Gold	2,251	6,254	7,837 ^{r,3}	8,305 ^{r,3}	8,172
Iron and steel:					
Iron ore:					
Gross weight	11,233 ^{r,3}	11,296 ^{r,3}	10,524 ^{r,3}	11,534 ^{r,3}	11,160
Iron content ^c	7,300 ^r	7,340 ^r	6,840 ^r	7,500 ^r	7,250
Steel ^c	5,000	5,000	5,000	5,000	5,000
INDUSTRIAL MINERALS					
Cement	409,513	322,419	324,415 ^{r,3}	552,382 ^{r,3}	565,029
Gypsum	49,229	44,428	36,928	65,245 ^{r,3}	72,153
Salt	420	570	455	391 ^{r,3}	690
MINERAL FUELS AND RELATED MATERIALS					
Petroleum, crude	5,487 ^{r,3}	4,412 ^{r,3}	4,105 ^{r,3}	3,025 ^{r,3}	2,824

^cEstimated; estimated data are rounded to no more than three significant digits. ^rRevised. do. Ditto.

¹Table includes data available through December 31, 2012.

²In addition to the commodities listed, modest quantities of crude construction materials (clays, sand and gravel, and stone), phosphate rock, and quartz presumably were produced, but output was not reported quantitatively.

³Reported figure.

TABLE 2
MAURITANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement		Ciment de Mauritanie (Private Mauritanian investors, 90%, and Compañía Valenciana de Cementos, 10%)	Nouakchott	900
Do.		Mauritano-Française des Ciments S.A.	do.	450
Copper		Mauritanian Copper Mines (First Quantum Minerals Ltd., 100%)	Guelb Moghrein Mine, 250 kilometers northeast of Nouakchott	37
Gold	kilograms	do.	do.	2,900
Do.	do.	Tasiast Mauritanie Ltd. S.A. (Kinross Gold Corp., 100%)	Tasiast, 300 kilometers north of Nouakchott	7,300
Gypsum		Société Arabe des Industries Métallurgiques (SAMIA) [Industrial Bank of Kuwait, 50%, and Société Nationale Industrielle et Minière (SNIM), 50%]	Sebkhia N'dramcha, Nouakchott	100
Iron ore		Société Nationale Industrielle et Minière (SNIM) (Government, 78.35%; Industrial Bank of Kuwait K.S.C, 7.17%; Arab Mining Co., 5.66%; Iraq Foreign Development Fund, 4.59%; Office National des Hydrocarbures et des Mines, 2.30%; Islamic Development Bank, 1.79%; private investors, 0.14%)	Guelb el Rhein, Kedia d'Idjill, and M'Haoudat Mines, Tiris Zemmour region	12,000
Do.		El Aouj Mining Co. S.A. [Société Nationale Industrielle et Minière (SNIM), 50%, and Xstrata plc, 50%]	Guelb el Aouj Mine, ¹ Tiris Zemmour region	7,000
Petroleum, crude	thousand 42-gallon barrels	PETRONAS International Corporation Ltd.	Chinguetti oilfield, 80 kilometers offshore	3,000
Quartz		JV of Mauritania Minerals Co., 90%, and Government, 10%	Oum Agueina	300
Salt	metric tons	Société Mauritanienne des Industries du Sel (SOMISEL)	Sabkha de N'terert and d'Idjill brine pits, in the southwestern part of the country	500

Do, do. Ditto

¹Under development.