

# THE MINERAL INDUSTRY OF NIGERIA

By Philip M. Mobbs<sup>1</sup>

Nigeria was Africa's largest oil producer in 1995. It ranked 12th in world production of crude petroleum, accounting for about 3% of world production and about 8% of the Organization of Petroleum Exporting Countries' total production. The oil sector remained the mainstay of the Nigerian economy, providing about 80% of total Government revenues and accounting for more than 90% of the country's total export earnings.

Both the economy and the mineral industry reflected the dominance of a single product, crude petroleum. The country had considerable mineral wealth and potential for the development of a diversified mineral industry. The Government was actively encouraging the diversification of the nation's mineral industry.

Mineral rights were held by the Federal Government. Mining fell under several laws and associated regulations and amendments, including the Explosives Act of 1964, the Quarries Act of 1969, the Nigerian Mining Corporation Act of 1972, the Gold Trading Act of 1990, and the Investment Promotion decree of 1995.

The Government created the Ministry of Solid Minerals Development from sections of the former Ministry of Petroleum and Mineral Resources. Nigeria was determined to attract foreign investment, and the National Minerals Policy was formulated in 1994 to revitalize the solid minerals sector. The Government was attempting to revive companies that produced barite, kaolin, gold, marble, and tin, as well as formalizing operations at deposits that had been developed by unlicensed artisanal miners. (*See table 1.*)

The Raw Materials Research and Development Council (RMRDC) enumerated a number of mineral commodities as prospects for development. Among the mineral deposits identified for investor consideration were asbestos, barite, bauxite, bentonite, diatomite, dolomite, feldspar, fireclay, fluorspar, graphite, gypsum, ilmenite, kaolin, kyanite, limestone, phosphate, salt, soda ash, sulfur, and talc. Gemstones, including amethyst, aquamarine, sapphire, topaz, and tourmaline, also were reported to be in commercial quantities. Behre Dolbear of the United States was officially collecting data for a formal database of known mineral deposits in Nigeria and was to conduct economic evaluations of selected deposits. The Government proposed to develop any viable deposit by encouraging international mining companies to form joint ventures with State companies or to

lease the prospect.

The Federal Environmental Protection Agency Act of 1988 gave the Agency overriding authority for the protection and development of the environment and environmental technology. Other environmental guidelines or regulations included the Pollution Control Guidelines of 1991, the Pollution Abatement Regulations of 1991, the Solid and Hazardous Waste Regulations of 1991, the Effluent Limitation Regulations of 1991, and the Harmful Waste Act of 1992.

During 1995, Shell Petroleum Development Co. of Nigeria Ltd. initiated the Niger Delta Environmental Survey. Shell, the largest oil producer in the country, announced that for the period 1989-93 it had averaged 221 spills per year. Equipment failure accounted for spills totaling approximately 5,300 barrels each year while an estimated 2,050 barrels spilled each year was attributed to sabotage. Under Nigerian law, oil companies did not pay compensation for spills caused by sabotage. Due in part to the international attention attracted by the spills, Shell was initiating a facility and equipment replacement program. In addition to environmental problems directly attributable to the mineral industry, such as oil spills and gas flares, the nation must contend with deforestation, soil erosion, and overintensive farming attributed to the rapidly expanding population of the Delta region.

Nigeria was the fifth largest source of imported crude oil to the United States. Exporting approximately 226 million barrels to the United States in 1995, Nigeria accounted for 9% of the United States' total crude oil imports, trailing only Saudi Arabia, Venezuela, Mexico, and Canada. The United States continued to be the largest importer of Nigerian crude oils, accounting for about 36% of the country's oil exports. Other major consumers of Nigerian crude were France, the Netherlands, Spain, and the Economic Community of West African States member countries. Nigerian mineral exports also included coal, steel, tin, and some industrial minerals.

Ninety percent of U.S. investment in Nigeria was in the oil and gas sector. During 1995, the Government authorized international investors to purchase stock in local mineral companies; however, the petroleum sector was excluded. Nominally, total foreign equity ownership in the petroleum sector was limited to 40% of each venture. However, the Shell consortium of Shell, Elf Petroleum Nigeria Ltd., and

Agip SpA, controlled 51% of the Nigeria Liquefied Natural Gas Ltd. joint venture, and Mobil Producing Nigeria Ltd. held 51% of its Oso Natural Gas Liquids recovery project joint venture with the remainder held by the state-owned Nigerian National Petroleum Corp. (NNPC).

Other major parastatal agencies included Nigerian Coal Corp., the Nigerian Steel Development Authority, and the associated companies of the Nigerian Mining Corp. All minerals with significant production such as coal, columbite, and tin were mined by parastatal companies or joint-venture/partnership companies. (*See table 2.*)

The Aluminum Smelter Co. of Nigeria (Alscon) continued construction of the two-pot line 180,000-metric-ton-per-year smelter at Ikot Abasi, Cross Rivers State, in southeastern Nigeria. Nigeria Gas Co. (NGC), a subsidiary of NNPC, was constructing a 103-kilometer (km) gas pipeline to the plant. Gas was to be provided by Shell, which had formerly flared the gas for lack of market. Alscon was owned by the Nigerian Government, 70%; Ferrostaal AG of Germany, 20%; and Reynolds International of the United States, 10%. The company intended to initially use imported bauxite from neighboring West African countries, and subsequently, locally produced bauxite. Most of the plant's production was projected to be exported.

The Nigerian steel industry was comprised of the Ajaokuta Steel Complex at Ajaokuta and the Delta Steel Co. Ltd. at Aladja, near Warri, with three inland rolling mills at Jos, Katsina, and Oshogbo. It was estimated that the Ajaokuta complex needed an additional \$1 billion to become fully operational. The Government was negotiating with international investors in an attempt to lease the Ajaokuta and the Delta Steel plants. The Government hoped to limit its losses by divesting itself of unproductive investments in the public sector. Leasing the steel plants to private companies was thought to be a way to improve both product quality and plant volume.

The National Iron Ore Mining Co. continued to stockpile iron ore for the Ajaokuta and the Delta steel plants. The Itakpe-based company mined ore grading between 36% and 38% iron. Ore was crushed and beneficiated to concentrates grading 63% to 67% iron to meet the requirements of the Delta Steel Plant.

An oil-well cement plant was under construction at Papalanto. The plant, reported to be owned by Ogun State and Triple-One International Investments of the United States, was to begin production in 1997. To the dismay of local cement companies, the Government banned gypsum imports in early 1995 as an incentive to develop the Nigerian gypsum industry. However, by midyear gypsum again was being imported.

A subsidiary of Nigerian Mining Corp. was evaluating barite deposits in Plateau State. The RMRDC continued pilot-plant operations for kaolin, phosphate rock, soda ash,

and talc.

Of the natural gas produced in Nigeria, about 79% was flared and 9% marketed, while another 9% was reinjected. The remainder was used in the field for energy generation. When the industry infrastructure was being installed in the 1960's and 1970's, there was no apparent market for Nigerian natural gas. Cheap oil further undercut any economic incentives to build gas infrastructure in the Delta. Because no facilities were initially built to collect, treat, compress, and transport the low-pressure associated gas produced with the oil, the excess gas has been flared for the past 40 years. The flares have become an international environmental issue, especially in Ogoni, a region in Rivers State.

The limited industrial activity and the resultant lack of a natural gas market in Nigeria was slowly changing. The Government began actively encouraging local consumption or the reinjection of gas into producing reservoirs. Only the NGC bought gas from producers and sold it to local customers. NGC sold most of its gas to Nigeria Electric Power Authority powerplants and to the National Fertilizer Co. of Nigeria in Onne, which used natural gas as a feedstock. Current projects to utilize the abundant natural gas included the Mobil and NNPC joint venture that was planning an offshore natural gas liquids (NGL's) extraction facility to process associated gas produced with condensate at the Oso Field. Recovered liquids were to be piped 67 km to Bonny Island, where up to 50,000 barrels per day (bbl/d) of NGL's would be separated into propane, butane, and pentane. Processed gas would be reinjected to maintain reservoir pressure in the Oso Field.

Nigeria Liquefied Natural Gas Ltd. was planning a two-train, 5.9-million-ton-per-year- capacity liquefied natural gas (LNG) liquefaction plant at Finima on Bonny Island. The project's equity ownership was modified after the International Finance Corp.'s withdrawal following the Government's execution of nine anti-Government activists. At yearend, NNPC held 49% of the project, with Shell at 25.6%, Elf holding 15%, and Agip with 10.4%. LNG was contracted to be exported to France, Italy, Spain, and Turkey.

Chevron Nigeria Ltd. and NNPC were planning a liquefied petroleum gas (LPG) extraction plant at Escravos. Startup was scheduled for 1997. LPG sales were to be augmented with natural gas throughput that had to be sold to the State-owned NGC. During 1995, NGC reportedly paid approximately \$2.80 per thousand cubic meter (8 cents per thousand cubic feet) of natural gas. The venture projected a daily output of 4,250 thousand cubic meters of gas. The proposed West African Gas Pipeline to Benin, Togo, and Ghana was targeted as a prime customer for the plant's natural gas.

Production of crude petroleum remained stable. Most production was from relatively small onshore fields in the

southern part of the country near the delta of the Niger River, with nearly all the rest produced from offshore wells on the shallow continental shelf. Companies were moving further offshore as the delta and near-shore fields matured, following the regional deepwater exploration trend in West Africa. Production of crude petroleum in 1995 averaged 2 million barrels per day (Mbbbl/d), of which about 1.8 Mbbbl/d was exported.

Nigeria had four oil refineries—one in Kaduna, two in Port Harcourt, and one in Warri—with a combined capacity of 445,000 bbl/d. Most of the petroleum products refined in the country were intended for domestic consumption, but the heavier products were exported. The Kaduna refinery and the Warri refinery were repaired and reopened in 1995. However, all the nation's refineries were producing well below capacity and the country had to import processed petroleum products. Refinery problems were attributed to various causes, including in no particular order, poor maintenance, spare parts shortages, sabotage, poor management, and general inefficiency. Additionally, product pipelines to population centers in the interior were damaged repeatedly when thieves diverted fuels from the pipelines.

The indigenous population of the delta directed a wide range of demands at operating companies for electricity, employment, floodwalls, road building, schools, and potable water supply. Oil companies had active community development programs that provided many of these government-type services, but not all communities in the delta benefited equally. In addition to sabotage, vandalism, and general violence directed at oil facilities, there were demands for oil companies to pressure the military government to transfer mineral rights from the Federal Government to local control.

The Nigerian railway system, the fifth largest in Africa, consists of 3,510 km of 1.067-meter-gauge track. The two main north-south lines, from Lagos to Kano (1,126 km) and from Port Harcourt to Maiduguri (1,443 km), were connected by a 179-km east-west line from Kaduna to Kafanchan. Lines such as the Ajaokuta-Port Harcourt spur were used to transport goods and mineral commodities to ports. Roads totaled about 120,000 km, of which 35,000 km was paved. Inland waterways of about 9,000 km consisted mainly of the Niger and Benue Rivers; these also served as routes for commodity transport.

The Kainji dam and powerplant, with a capacity of about 11,500 megawatts, was the major source of hydroelectric power for the country. Major ports included Apapa and Tin Can Island in Lagos, Port Harcourt, and Koko near Warri.

The Government's fiscal and financial incentive programs were designed to attract local and foreign investors into new investments in the mineral industry. However, the country's reputation for civil strife and corruption tempered investor's interest. Petroleum and natural gas were expected to continue dominating the economy for the foreseeable future, despite reduced funding of NNPC by the Government that resulted in NNPC's deferral of payments for its share of joint-venture operations. Major changes in policy and programs owing to the political situation in the country could affect industrial development, particularly the nonfuel minerals industry. Successful development of the steel sector could enhance the growth of heavy equipment and metalworking industries and would provide needed jobs for the labor force. Revitalization of the coal industry could provide an additional source of foreign exchange when fully exploited.

The mineral industry as a whole should continue to enjoy considerable growth because of increasing activity in the mineral fuels sector. The utilization of Nigerian natural gas could provide a reliable energy source and feedstock for the chemical and petrochemical industries. Completion of the West African gas pipeline would provide Nigeria with additional revenue and regional goodwill. Development of other nonfuel minerals would broaden the country's industrial base.

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<sup>1</sup>Text prepared July 1995 by David Izon, updated Oct. 1996 by Philip M. Mobbs.

### **Other Sources of Information**

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TABLE 1  
NIGERIA : PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1991	1992	1993	1994	1995 e/
<b>METALS</b>					
Columbium and tantalum concentrates:					
Gross weight	36	40	40 e/	30 e/	30
Columbium content e/	15	17	17	13 3/	13
Iron and steel:					
Iron ore, gross weight e/	398 3/	400	400	400	168
Steel, crude	250	200 e/	150 e/	105	36
Lead, mine output, Pb content e/	100	100	100	3,500 3/	3,500
Tin:					
Mine output, cassiterite concentrate:					
Gross weight	350	568	580 e/	278 e/	278
Sn content	255	415	400 e/	185	185
Metal, smelter	230	370	350 e/	179	179
<b>INDUSTRIAL MINERALS</b>					
Cement, hydraulic e/	3,500	3,200 r/	3,200 r/	2,600 3/	3,000
Clays: e/					
Kaolin	1,300	1,300	1,300	105,000 3/	105,000
Unspecified	60,100	60,100	60,100	60,100	60,000
Feldspar e/	700	700	700	700	700
Nitrogen:					
N content of ammonia	367	337	350 e/	350 e/	350
N content of urea	373	486	400 e/	400 e/	400
Stone:					
Limestone	1,440	1,400	1,400 e/	2,700	2,700
Marble e/	1,600	1,600	1,600	7,300 3/	7,300
Shale e/	70	70	70	70	500
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coal, bituminous	138	140	140 e/	140 e/	22
Gas, natural:					
Gross	31,300	32,000	31,300 e/	31,300 e/	34,000
Dry	2,570	2,897	2,600 e/	2,600 e/	4,000
Petroleum:					
Crude	690,600 r/	710,000 r/	748,000 r/	743,500 r/	740,000
Refinery products:					
Gasoline	30,800	33,200	30,800	30,800 e/	20,500
Jet fuel e/	900	2,500 r/	500	500 e/	1,000
Kerosene	14,800	12,000 r/	14,500	14,500 e/	7,500
Distillate fuel oil	26,500	22,000 r/	15,500	15,500 e/	16,000
Residual fuel oil	13,500	18,600 r/	800	800 e/	13,500
Unspecified	1,620	8,700 r/	1,000	1,000 e/	1,500
Total	88,120	97,000 r/	63,100	63,100 e/	60,000

e/ Estimated. r/ Revised.

1/ Includes data available through Oct. 18, 1996.

2/ In addition to the commodities listed, aquamarine, barite, diamond, emerald, gold, gypsum, phosphate rock, soda ash, talc, tourmaline, zinc, and a variety of crude construction materials (stone, sand and gravel) are produced, but information is inadequate to estimate output.

3/ Reported figure.

TABLE 2  
NIGERIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement		West Africa Portland Cement Co. (Associated International Cement, 39.4%; Odu'a, 26.8%; public, 17.2%; Government, 16.6%)	Ewekoro Shagamu	750. 600.
Coal		Nigerian Coal Corp. (Government, 100%)	Enugu	150.
Iron ore		National Iron Ore Mining Co. (Government, 100%)	Itakpe, near Okene	1,300.
Iron and steel		Ajaokuta Steel Co. Ltd. (Government, 100%)	Ajaokuta	(1/)
		Delta Steel Co. Ltd. (Government, 100%)	Aladja	1,000.
		Jos Steel Rolling Co. Ltd. (Government, 100%)	Jos	210.
		Katsina Steel Rolling Co. Ltd. (Government, 100%)	Katsina	210.
		Oshogbo Steel Rolling Co. Ltd. (Government, 100%)	Oshogbo	210.
Nitrogen		National Fertilizer Co. of Nigeria (Government, 63%; M.W. Kellog, 37%)	Onne	548 N content of ammonia. 360 N content of urea.
<b>Petroleum:</b>				
Crude	million 42-gallon barrels	Nigerian National Petroleum Corp. (Government, 60%; private, 40%)	Lagos	750.
Refinery products	do.	New Port Harcourt refinery (Government, 100%)	Port Harcourt	55.
	do.	Warri refinery (Government, 100%)	Warri	43.
	do.	Kaduna refinery (Government, 100%)	Kaduna	38.
	do.	Old Port Harcourt refinery (Government, 100%)	Port Harcourt	22.
Tin		Makeri Smelting Co. Ltd. (Government, 100%)	Jos	1.

1/ Construction of the 1.2-million-metric-ton-per-year plant was stalled. The plant was 98% complete at yearend.