The Mineral Industry of Zambia

By Gertrude N. Greenspoon [1]

Production of copper, the predominant commodity in the Zambian mineral industry, did not regain the level existing prior to disruption of operations at the Mufulira mine in September 1970. The reduced output together with lower copper prices resulted in a drop in value to $620 million from $908 million [2] in 1970. The copper industry, however, continued as the main provider of government revenue. Since 1965, copper has accounted for over 90 percent of total export values.

Although the first national development plan was to end in 1970, it was extended until the end of 1971. The extension provided time to assess Zambia's past economic reforms. The second national development plan, effective January 1972 to December 1976, will give priority to rural development.

Mindeco, Ltd., a State corporation operating under the Ministry of Mines and Mining Development, which had acquired 51 percent interests in the copper, lead, and zinc mines, was planning expansions in the small mines sector. These included an emerald deposit near Kalulushi and a tin mining cooperative in the Choma district.

The Metal Fabricators of Zambia (ZAMEFA) manufacturing plant at Luanshya began operations in February. The company will supply about 80 percent of Zambia's demand for finished and semifinished products. The remainder of demand, consisting of highly specialized products, will continue to be imported.

By yearend the Export Import Bank (EXIM) was considering requests for expansions in the Zambian copper industry. A Nchanga Consolidated Copper Mines, Ltd. (NCCM) loan would approximate $30 million, and that of Roan Consolidated Mines, Ltd. (RCM) about $20 million. Both loans would cover purchase of U.S. goods and services for expansion of mining and processing facilities. Financial arrangements for each would be 10 percent cash payment, 45 percent EXIM direct credit, and 45 percent commercial bank credit with EXIM guarantee or repayment. Proposed repayment terms would be 10 years beginning in early 1974.

The 1,100-mile Tan Zam Railway scheduled for completion in 1975 was about a year ahead of schedule. Work was begun from the port of Dar es Salaam, Tanzania, on the Indian Ocean and was nearing the Zambia border by yearend 1971.

Difficulties experienced in obtaining generators, transformers, and other equipment for the Kafue hydroelectric plant increased costs from $193 million to $202 million. Construction of the project was proceeding steadily.

PRODUCTION

The value of mineral production totaled $659 million in 1971, a 30-percent decrease from 1970, and was the lowest since 1965. Output of blister and anode copper and electrolytic copper dropped 6 and 8 percent, respectively, reflecting limited activity at the Mufulira mine. A 7-percent increase was recorded in electrolytic zinc production, and a small gain was made in refined lead output. Coal production rose 30 percent to a record high.

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[2] Where necessary, values have been converted from the Zambian currency kwacha to U.S. dollars at the rate of K1.00=US$1.40.

Table 1.—Zambia: Production of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1969	1970	1971 p
METALS			
Cadmium metal	6	12	10
Cobalt:			
Mine output, metal content	1,812	2,400	2,080
Metal	1,798	2,052	1,886
Copper: [1]			
Mine output, copper content	719,467	684,064	651,396
Blister and anodes, copper content	703,692	682,820	643,674
Refined	603,199	580,722	534,339
Gold [2] e troy ounces	5,000	r 4,800	4,400
Lead: [1]			
Mine output, lead content	22,900	32,900	30,800
Smelter (refined)	23,007	r 27,300	27,700
Manganese ore, gross weight	25,659	--	--
Selenium [3] e kilograms	26,000	r 25,000	23,000
Silver [4] e thousand troy ounces	768	r 740	680
Zinc: [1]			
Mine output, zinc content	68,200	65,800	68,700
Smelter (electrolytic)	50,165	r 53,500	57,000
NONMETALS			
Amethyst kilograms	114,172	35,172	93,417
Cement, hydraulic thousand tons	r 331	r 377	e 470
Gypsum	1,200	(5)	--
Lime, hydraulic and quick thousand tons	r 75	104	e 104
Stone:			
Limestone	772,291	741,193	e 800,000
Phyllite	63,093	56,171	73,291
Talc	2,290	--	713
MINERAL FUELS AND RELATED MATERIALS			
Coal, bituminous thousand tons	397	r 623	812

e Estimate. p Preliminary. r Revised.

[1] Data on copper, lead, and zinc are reported under somewhat different headings than in previous editions of this chapter in order to conform with general style guidelines for this volume of the Minerals Yearbook.

[2] Chiefly contained in blister copper, refinery muds, and electrolytic copper.

[3] Contained in blister copper, refinery muds, and electrolytic copper.

[4] Refined silver and silver contained in blister copper, refinery muds, and electrolytic copper.

[5] Revised to none.

TRADE

The value of mineral exports from Zambia in 1970 was $985 million, 98 percent of total commodity exports. Copper continued as the principal export, accounting for 97 percent of the mineral commodities exported and 95 percent of all exports. Japan displaced the United Kingdom as Zambia's major market.

Imports in 1970 were valued at $502 million, 15 percent more than in 1969 and a record high. Mineral commodities accounted for $65 million. Despite completion of the petroleum products pipeline and production of indigenous coal, Zambia imported mineral fuels in 1970 valued at $54 million.

The value of mineral trade and total trade was as follows in million dollars:

	Mineral commodity trade	Total commodity trade
Exports:		
1968	744.2	762.2
1969	1,046.5	1,073.1
1970	984.6	1,000.7
Imports:		
1968	52.6	455.3
1969	56.1	436.5
1970	64.8	501.9

Trade missions to and from Zambia were much in evidence during 1971. On June 21, the Mineral and Metals Trading Corp. of India announced that a 3-year trade agreement was signed with Zambia. The agreement called for the purchase by India of 18,000 tons of copper annually.

Also in June, Mindeco, Ltd., said Zambia would sell 1,000 tons of copper monthly to the People's Republic of China. The contract was signed in Peiping by a negotiating team from RCM with the China National Metals & Minerals Import & Export Corp. Shipments would be from Dar es Salaam beginning in August. A trade agreement with the U.S.S.R. was signed on December 17. The agreement reportedly set forth the basic principles on which trade between the two countries will be carried out and established the lists of goods to be traded. Among the items to be imported by Zambia are mining equipment, chemical fertilizers, and rolled steel. The U.S.S.R. will import copper and copper products, lead, and zinc.

Table 2.—Zambia: Exports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1969	1970	Principal destinations, 1970
METALS			
Cadmium metal	r 9	31	Republic of South Africa 30; Southern Rhodesia 1.
Cobalt metal	1,588	1,814	United Kingdom 1,640; Japan 100; Australia 58.
Copper metal including alloys:			
Sludge	882	651	Japan 448; West Germany 126; Belgium 77.
Slimes	681	815	West Germany 384; Sweden 345; Japan 86.
Unwrought, crude:			
Anodes	3,190	736	Austria 652; Italy 84.
Blister	107,124	103,226	Japan 55,264; West Germany 20,438; United Kingdom 13,469.
Refined:			
Wire bars	584,288	543,998	United Kingdom 129,986; Japan 97,739; Italy 73,637; West Germany 60,684.
Cathode form	33,169	33,628	Japan 12,167; United Kingdom 10,824; West Germany 3,182.
Ingots and bars	923	990	Japan 588; Belgium 319; West Germany 83.
Iron and steel semimanufactures	--	(1)	
Lead:			
Unwrought	25,891	22,065	Republic of South Africa 9,366; Italy 3,527; Arab Republic of Egypt 3,277; Iran 2,561.
Semimanufactures	(1)	16	All to Southern Rhodesia.
Silver unworked troy ounces	49,163	97,491	Republic of South Africa 97,491.
Zinc:			
Unwrought	53,586	50,343	Republic of South Africa 15,037; Greece 5,265; Italy 5,104; Yugoslavia 3,999.
Semimanufactures	--	(1)	
NONMETALS			
Abrasives, natural, precious and semiprecious stones kilograms	27,573		
Cement	202	5,475	Zaire 5,315; Tanzania 160.
Lime	--	65	All to Zaire.
Precious and semiprecious stones, except diamond value, dollars	$593,765	$697,728	Hong Kong $422,129; West Germany $217,200; Netherlands $26,173.
Talc	984	358	Republic of South Africa 308; United Kingdom 49.

r Revised.
1 Less than ½ unit.

Table 3.—Zambia: Imports of mineral commodities

(Metric tons unless otherwise specified)

Commodity	1969	1970	Principal sources, 1970
METALS			
Aluminum semimanufactures	517	601	Republic of South Africa 181; Tanzania 116; United Kingdom 77.
Antimony:			
Powder including tellurium powder	2	--	
Ingots and bar	29	--	
Arsenic acid	12	--	
Chromium ore and concentrate	1,960	595	All from Republic of South Africa.

Table 3.—Zambia: Imports of mineral commodities—Continued

(Metric tons unless otherwise specified)

Commodity	1969	1970	Principal sources, 1970
METALS—Continued			
Cobalt metal including alloys, all forms	5	--	
Copper:			
Copper sulfate	r310	5	Republic of South Africa 5.
Metal including alloys, all forms	419	862	Republic of South Africa 339; United Kingdom 181; Zaire 177.
Iron and steel:			
Ore and concentrate	38	29,379	Republic of South Africa 29,070; France 309.
Pig iron, sponge iron and ferroalloys	3,766	3,314	Republic of South Africa 3,274; France 22; Sweden 14.
Ingots and other primary forms	11	113	Republic of South Africa 59; Japan 52.
Semimanufactures	119,074	86,236	Republic of South Africa 43,083; Japan 15,239; United Kingdom 11,697.
Lead:			
Oxides	15	85	United Kingdom 71; Republic of South Africa 13.
Metal unwrought and semimanufactures including alloys	r36	44	Republic of South Africa 19; United Kingdom 8.
Mercury, 76-pound flasks	12	8	All from United Kingdom.
Nickel metal including alloys	NA	14	Switzerland 6; Republic of South Africa 5.
Platinum-group metals, metals including alloys, all forms, troy ounces	NA	889	United Kingdom 849; Republic of South Africa 40.
Silver metal including alloys, do	NA	15,373	Republic of South Africa 14,433; United Kingdom 844.
Tellurium elemental	NA	145	All from Republic of South Africa.
Tin metal including alloys, long tons	85	65	Republic of South Africa 33; United Kingdom 21.
Titanium oxide	301	594	Republic of South Africa 400; West Germany 126; Norway 60.
Zinc:			
Oxides	19	NA	
Metal including alloys	8	6	Belgium 2; United Kingdom 2; Republic of South Africa 1.
Other:			
Ore and concentrates of base metals n.e.s.	51	78	All from Republic of South Africa.
Ash and residue containing nonferrous metals	1	20	Do.
Metals including alloys, all forms	37	120	Republic of South Africa 82; Japan 24; Zaire 12.
NONMETALS			
Abrasives:			
Pumice, emery, natural corundum, etc.	6	16	West Germany 10; Republic of South Africa 5.
Grinding and polishing wheels and stones	125	[1] $280,519	Republic of South Africa $230,418; West Germany $13,931; United Kingdom $12,270.
Other, crude	32	1	Republic of South Africa 1.
Asbestos	--	15,607	Republic of South Africa 15,585; Italy 21.
Barite	146	112	Republic of South Africa 68; West Germany 24; France 20.
Boron materials:			
Crude, natural borates	9	105	Republic of South Africa 105.
Oxide and acid	NA	9	Republic of South Africa 6; Netherlands 2.
Bromine, kilograms	1,246	--	
Cement	9,005	917	United Kingdom 433; Denmark 243; Republic of South Africa 207.
Chalk	NA	391	United Kingdom 304; West Germany 44.
Clays and products (including all refractory bricks):			
Crude n.e.s.:			
Fire	569	283	United States 200; Republic of South Africa 74.
Fuller's earth, dinas, chamotte	177	100	United Kingdom 89; Republic of South Africa 11.
Kaolin (china)	1,500	708	Republic of South Africa 391; United Kingdom 209; United States 91.
Other	NA	1,189	Republic of South Africa 1,090; United Kingdom 57; United States 41.
Products:			
Refractory (including nonclay bricks) value, thousand dollars	$1,568	$1,624	Republic of South Africa $766; United Kingdom $258.
Nonrefractory, do	$173	$168	Republic of South Africa $85; United Kingdom $71.

See footnotes at end of table.

Table 3.—Zambia: Imports of mineral commodities—Continued

(Metric tons unless otherwise specified)

Commodity	1969	1970	Principal sources, 1970
NONMETALS—Continued			
Diatomite and other infusorial earths	286	804	Republic of South Africa 395; United States 376; Kenya 33.
Feldspar and fluorspar	NA	45	Republic of South Africa 38; Southern Rhodesia 7.
Fertilizer materials:			
Crude, phosphatic	NA	175	Republic of South Africa 95; United Kingdom 44.
Manufactured:			
Nitrogenous	54,340	31,743	Netherlands 15,231; Republic of South Africa 12,627; France 2,471.
Phosphatic		4,188	Republic of South Africa 4,095; Netherlands 91.
Potassic		3	Republic of South Africa 1; United Kingdom 1; West Germany 1.
Other including mixed		1	United Kingdom 1.
Ammonia, anhydrous	57	1,245	Republic of South Africa 640; Southern Rhodesia 586; West Germany 13.
Graphite, natural	34	6	United Kingdom 6.
Gypsum and plasters	19,099	11,822	Republic of South Africa 11,663.
Lime (building)	397	NA	
Magnesite including magnesium carbonate	74,917	286	Republic of South Africa 269; United Kingdom 17.
Mica, all forms	3	30	Republic of South Africa 23.
Pigments, mineral:			
Natural crude	10	26	Republic of South Africa 20; West Germany 6.
Iron oxides, processed	146	311	United Kingdom 223; Republic of South Africa 63.
Precious and semiprecious stones, except diamond—value, thousand dollars	r$88	$26	Zaire $17; Republic of South Africa $3.
Pyrite (gross weight)	22	--	
Salt	45,346	13,186	United Kingdom 4,794; Angola 4,130; Mozambique 2,598.
Sodium and potassium compounds n.e.s.:			
Caustic soda	3,146	2,163	United States 645; Italy 500; West Germany 257; Japan 202.
Caustic potash, sodic and potassic peroxide	20	22	Norway 16; Czechoslovakia 3.
Stone, sand and gravel:			
Dimension stone	210	101	Republic of South Africa 81; Kenya 19.
Dolomite, chiefly refractory grade	NA	2,500	All from Sweden.
Gravel and crushed rock	NA	75	Republic of South Africa 44; United Kingdom 31.
Limestone (except dimension)	1,311	26	All from Republic of South Africa.
Sand excluding metal bearing	88	196	Republic of South Africa 147; United Kingdom 49.
Sulfur:			
Elemental, all forms	63	53	Republic of South Africa 27; United Kingdom 26.
Sulfuric acid	6,242	268	Republic of South Africa 143; Israel 80; Southern Rhodesia 18.
Talc, steatite, soapstone, and pyrophyllite	57	7	United States 5; Norway 2.
Vermiculite	8	10	All from Republic of South Africa.
Other nonmetals n.e.s.:			
Crude	NA	203	Republic of South Africa 152; Australia 50.
Slag, dross and similar waste, not metal bearing	NA	105	All from United Kingdom.
Oxides and hydroxides n.e.s.	392	2,179	France 1,005; Republic of South Africa 543.
Building materials of asphalt, asbestos and fiber cement and unfired nonmetals n.e.s.	NA	3,091	Republic of South Africa 2,539; Singapore 282; Belgium 210; United Kingdom 55.
MINERAL FUELS AND RELATED MATERIALS			
Carbon black and gas carbon	393	NA	
Coal and coke including briquets	760,808	364,921	Southern Rhodesia 352,859; United Kingdom 11,569.
Gas, hydrocarbon	2,355	527	Republic of South Africa 262; Tanzania 262; France 3.
Petroleum:			
Crude and partly refined—42-gallon barrels	63	--	
Refinery products:			
Gasoline—thousand 42-gallon barrels	1,112	1,145	Iran 1,095; Tanzania 39.
Kerosine—do	65	83	Iran 46; Tanzania 33; Saudi Arabia 3.

See footnotes at end of table.

Table 3.—Zambia: Imports of mineral commodities—Continued

(Metric tons unless otherwise specified)

Commodity	1969	1970	Principal sources, 1970
MINERAL FUELS AND RELATED MATERIALS —Continued			
Petroleum—Continued			
Refinery products—Continued			
Jet fuel, thousand 42-gallon barrels	159	276	Tanzania 246; Iran 29.
Distillate fuel oil, do	1,585	1,620	Iran 1,540; Tanzania 61; Saudi Arabia 19.
Residual fuel oil, do	107	18	Kenya 18.
Lubricants, do	159	162	United Kingdom 81; Kenya 40; Republic of South Africa 14; United States 12.
Mineral jelly and wax, do	[2] 24	20	Indonesia 6; United States 4; Singapore 3.
Other:			
Pitch and pitch coke, 42-gallon barrels	28,320	132	United States 105; Republic of South Africa 7.
Petroleum coke, do		10,236	Iran 7,849; Tanzania 1,865.
Bituminous mixtures n.e.s., do		27,845	Kenya 19,701; Netherlands 1,545; United Kingdom 1,436.
Mineral tar and other coal-, petroleum-, or gas-derived crude chemicals, value, dollars	$15,480	$112,801	Kenya $93,600; United Kingdom $13,437; Republic of South Africa $1,859.

r Revised. NA Not available.
[1] Tonnage not reported.
[2] Previously reported in metric tons.

COMMODITY REVIEW

METALS

Cobalt.—At the Rokana division of NCCM, 2,600 tons of cobalt was produced in the 15-month period ended March 31, 1971. Construction of a new cobalt flotation circuit which will improve recovery and grade was nearly completed. In February, RCM acquired the Baluba property northwest of Luanshya. The Baluba project will be operated as part of the Luanshya division and was expected to be in production by the second half of 1973. The Baluba ore contains an estimated 0.17 percent cobalt. Concentrate will be sent to the Chambishi division for the production of cobalt hydroxide.

Copper.—Zambian copper production in 1971 was the lowest since 1966 as activities related to restoring full output at Mufulira continued. Partial production at Mufulira, begun in November 1970, attained a monthly rate of 6,000 tons by June 1971 but was 10,000 tons per month less than output planned prior to the accident on September 25, 1970.

The expansion program in the copper industry announced in 1970 continued, although it may not be possible to meet the original completion date of 1974. Two concentrators were completed and in operation, the Kalengwa in March and the Bwana Mkubwa in May. The leach-precipitation plant at Chingola was not completed in mid-1971 as scheduled, owing to delay in delivery of materials and equipment.

RCM produced 250,400 tons of refined copper in the year ended June 30, 1971, compared with 342,700 tons in the same period of 1970. Production at Mufulira continued to be affected by the cave-in on September 25, 1970, and total output by RCM was the lowest since the year ended June 30, 1967.

The Ndola Copper Refinery produced 119,400 tons of cathodes, and casting plant production of refinery shapes totaled 132,100 tons.

Ore production at Mufulira totaled 3.75 million tons averaging 2.20 percent copper (7.49 million tons and 2.51 percent in 1970). Smelter production, including concentrates and smelting ore from other RCM mines, was 128,900 tons of anodes (175,900 in 1970). Refined copper output was 84,400 tons, compared with 173,700 tons in 1970.

The Luanshya division produced a record 6.55 million tons in 1971. The smelter

produced 110,500 tons of anodes, and refined copper output was 101,700 tons. The Luanshya division was expanded by the acquisition in February of the Baluba Mines, Ltd., property. Production at Baluba is planned to begin in 1973 with an annual rate of 22,000 tons by the second half of the year. Total output at Luanshya will be increased to nearly 120,000 tons annually. The concentrator was being expanded to handle the Baluba ore, but existing smelter capacity will be sufficient to treat the concentrates.

At Chibuluma, 659,700 tons of ore averaging 4.01 percent copper and 0.20 percent cobalt was produced. Refined copper production totaled 23,900 tons, and cobalt hydroxide containing 922 tons of cobalt was sold to the Rokana division of NCCM. A total of 1.66 million tons of ore was produced at Chambishi, and output of refined copper totaled 30,000 tons. Expansion of underground mining to increase output to 48,000 tons of copper annually in 1973 at Chambishi continued during the year. The open pit mine at Kalengwa produced 116,300 tons of ore and 10,400 tons of refined copper. The 600-ton-per-day concentrator began operations in March, and by yearend most sections of the plant were operating satisfactorily. Ore and concentrate were smelted at Mufulira and Luanshya.

Ore reserve data for the RCM group at the end of June 1971 were as follows:

Mine	Thousand metric tons	Copper (percent)
Mufulira	132,500	3.16
Luanshya (includes Baluba)	130,300	2.71
Chambishi	39,900	2.93
Chibuluma	6,000	4.81
Kalengwa	1,600	8.53

Copper operations of NCCM, comprising Rokana, Chingola, and Konkola divisions, produced 494,800 tons of refined copper in the 15-month period ended March 31, 1971. A total of 6.7 million tons of ore was produced by the Rokana division, of which 56 percent was from the Mindola ore body. Smelter output was 368,000 tons, and refinery production totaled 364,500 tons.

At the Chingola division, 12.0 million tons of ore was produced; 3.4 million tons was from the Lower and Upper underground mines and 8.6 million from open pit operations (Nchanga, River Lode, Chingola, and Fitula). The Chingola concentrator treated 10.1 million tons, and 1.9 million tons was sent to the Konkola concentrator. In addition, the Konkola concentrator treated 2.3 million tons of ore from the Konkola division mining operations which yielded 61,900 tons of copper contained in concentrates.

The Bwana Mkubwa concentrator of the Rokana division began operations in May, and output was proceeding at the planned 15,000-ton-per-year rate. Slow delivery of materials and equipment delayed completion of the leach-precipitation plant at Chingola, and operations were rescheduled for late in the year. The solvent extraction-ion exchange process plant scheduled for 1973 would not be operable until early 1974. Although reopening of the Kansanshi mine was planned for 1973, production of copper would not begin until installation of the solvent extraction plant. Plans for the Torco process plant to treat Kansanshi ore were abandoned because of the substantial increase in the estimated cost of the plant.

Ore reserve data for the NCCM group were as follows:

Mine	Thousand metric tons	Copper (percent)
Chingola	234,900	3.91
Nkana	124,600	2.55
Bancroft	94,100	3.53
Kansanshi	6,500	3.44
Bwana Mkubwa	5,600	3.31

Lead and Zinc.—On January 1, 1971, the Broken Hill mine became the Broken Hill division of NCCM. Operations for this division reflect activities for the first 3 months of 1971. In this period, 7,400 tons of refined lead and 13,400 tons of zinc (7,600 tons from the Imperial Smelting Furnace and 5,800 tons from the electrolytic plant) were produced.

The flotation plant treated 30,700 tons of ore containing 10.6 percent lead and 29.2 percent zinc and produced 5,500 tons of lead concentrate, averaging 39.9 percent lead, and 6,200 tons of zinc concentrate, averaging 59.1 percent zinc. Proven reserves at the end of 1970 were 1.8 million tons averaging 23.7 percent zinc and 11.2 percent lead, and indicated reserves were 1.4 million tons containing 26.3 percent zinc and 10.7 percent lead.

A decision, dependent upon capital costs,

is expected to be made soon on the installation of Waelz kilns to treat refractory materials from dumps and future mining operations. The kilns could extend the life of the mine from 12 to 20 years.

NONMETALS

Construction of the Nitrogen Chemicals Co. of Zambia, Ltd., fertilizer plant was completed and operations commenced in February.

The development of lime production in Zambia has grown with the copper industry. Virtually all requirements of the copper producers are furnished from local sources. Development of the lime industry began in the late 1930's with operations on the edge of the Itawa stream at Ndola and at Misundu. Limestone was railed to Misundu for burning, but the kilns were abandoned in 1962 when the present operations were begun. The massive limestone bed extends from the fringe of Ndola to the Republic of Zaire border. The high-grade material is suitable both as smelter flux rock and as a feed for the kilns producing lime. Two quarries are in operation—Mwatesi, where the limestone is suitable as a flux rock; and Fox Cut, where the limestone is compact and suitable for kilning. Rights of part of the vast limestone deposit were transferred to Chilanga Cement Co. Ltd., and a $17.4 million lime plant was completed in 1969. The company announced plans for expanding output by the construction of a second kiln at Ndola.

Mindeco, Ltd., Zambia's mining development corporation, announced that studies were underway to determine the possibility of reopening the gypsum mine at Lochinvar, 30 miles northwest of Monze. The mine was originally operated by Anglo-American Corp. with plans to produce at the rate of 10,000 tons per year. After production of about 1,000 tons per year for 3 years, the operation closed at the end of 1968. Zambia relies on imports of gypsum to meet its requirements, which are estimated at 15,000 tons per year, principally for the cement industry. It is hoped that reactivation of the mine will develop use of gypsum in other industries such as plaster and agriculture.

Feasibility studies to develop a phosphate operation at Kaluwe were also in progress.

MINERAL FUELS

Coal.—In June, the National Coal Board of Zambia was reincorporated as Maambe Collieries, Ltd., a 100-percent subsidiary of Mindeco. Despite a record output of 812,000 tons, supplies of coal were adversely affected by delayed rail deliveries from Maamba in early 1971. By midyear, the situation had improved and coal stocks and rail deliveries were satisfactory.